MULTI-STEP BIDDING PROCESS
FOR
CONTRACTORS

Request For Solicitation For Construction Services

Stage II Electrical Contractors Bidders List

March 8, 2007

QUAD AREA LIGHTING UPGRADE REDWOOD ROAD CAMPUS

SALT LAKE COMMUNITY COLLEGE
SALT LAKE CITY, UTAH

DFCM Project No. 06106660

Thomas & Kolkman Engineering Co. Inc.
64 West 1700 South
Salt Lake City, Utah 84115

TABLE OF CONTENTS

Current copies of the following documents are hereby made part of these contract documents by reference. These documents are available on the DFCM web site at http://dfcm.utah.gov or are available upon request from DFCM:

DFCM General Conditions dated May 25, 2005
DFCM Application and Certificate for Payment dated May 25, 2005

Technical Specifications & Drawings: Thomas & Kolkman Engineers Co. Inc

The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at http://dfcm.utah.gov

INVITATION TO BID

ONLY FIRMS PRE-QUALIFIED DURING STAGE I OF THE RFS ARE ALLOWED TO BID ON THIS PROJECT

The State of Utah - Division of Facilities Construction and Management (DFCM) is requesting bids for the construction of the following project:

QUAD AREA LIGHTING UPGRADE - REDWOOD ROAD CAMPUS
SALT LAKE COMMUNITY COLLEGE – SALT LAKE CITY, UTAH
DFCM PROJECT NO: 06106660

Project Description: Upgrade existing Quad Area site lighting and campus wide lighting controls. Construction Cost Estimate: $225,000.00.

FIRM NAME	POINT OF CONTACT	PHONE	FAX
Arco Electric	Paula Sorensen	(801) 566-1695	(801) 566-0927
Capital Electric	Mike Mora	(801) 908-6660	(801) 908-6667
Electro Specialist, Inc.	Gordon Banks	(801) 572-2998	(801) 572-5658
Hidden Peak Electric Co., Inc	Brian Bales	(801) 262-5513	(801) 262-5689
Power Electric Company	Tina Sheppard	(801) 288-1064	(801) 288-1065
Taylor Electric and Engineering	Chris Joyal	(801) 413-1300	(801) 413-1361
Utah Controls, Inc.	Jeff Keller	(801) 990-1950	(801) 990-1955

The bid documents will be available at 4:00 PM on Thursday, March 8, 2007 and distributed in electronic format only on CDs from DFCM at the Wasatch Building at the Utah State Fairpark, approximately 155 North 1000 West, Salt Lake City, Utah and on the DFCM web page at http://dfcm.utah.gov. For questions regarding this project, please contact Jim Russell, Project Manager, DFCM, at (801)-538-9784. No others are to be contacted regarding this project. A **MANDATORY** pre-bid meeting and site visit will be held at 9:00 AM on Tuesday March 13, 2007 in the Second Floor Conference Room of the Construction Trades Building on the Redwood Road Campus of the Salt Lake Community College, 4600 So. Redwood Rd., West Valley, Utah. All pre-qualified prime contractors wishing to bid on this project must attend this meeting.

Bids must be submitted by 2:00 PM on Wednesday, March 28, 2007 at the Wasatch Building at the Utah State Fairpark, approximately 155 North 1000 West, Salt Lake City, Utah. Refer to the map on the DFCM website for directions (http://dfcm.utah.gov/downloads/fairpark_map.pdf). Bids will be opened and read aloud in the Wasatch Building at the Utah State Fairpark. Note: Bids must be received at the Wasatch Building at the Utah State Fairpark by the specified time. The contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

A bid bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's bid bond form, shall accompany the bid.

The Division of Facilities Construction & Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of the State.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
MARLA WORKMAN, CONTRACT COORDINATOR
4110 State Office Bldg., Salt Lake City, Utah 84114

STAGE II - MULTI-STEP BIDDING PROCESS

ONLY FIRMS PRE-QUALIFIED DURING STAGE I OF THE RFS ARE ALLOWED TO BID ON THIS PROJECT

1. Invitational Bid Procedures

The following is an overview of the invitational bid process. More detailed information is contained throughout the document. Contractors are responsible for reading and complying with all information contained in this document.

Notification: DFCM will notify each registered pre-qualified firm (via fax or e-mail) when a project is ready for Construction Services and invite them to bid on the project.

Description of Work: A description of work or plans/specifications will be given to each contractor. If required, the plans and specifications will be available on the DFCM web page at http://dfcm.utah.gov and on CDs from DFCM at the Wasatch Building at the Utah State Fairpark, approximately 155 North 1000 West, Salt Lake City, Utah.

Schedule: The Stage II Schedule shows critical dates including the mandatory pre-bid site meeting (if required), the question and answer period, the bid submittal deadline, the subcontractor list submittal deadline, etc. Contractors are responsible for meeting all deadlines shown on the schedule.

Mandatory Pre-Bid Site Meeting: If a firm fails to attend a pre-bid site meeting labeled "Mandatory" they will not be allowed to bid on the project. At the mandatory meeting, contractors may have an opportunity to inspect the site, receive additional instructions and ask questions about project. The schedule contains information on the date, time, and place of the mandatory pre-bid site meeting.

Written Questions: All questions must be in writing and directed to DFCM's project manager assigned to this project. No others are to be contacted regarding this project. The schedule contains information on the deadline for submitting questions.

Addendum: All clarifications from DFCM will be in writing and issued as an addendum to the RFS. Addenda will be posted on DFCM's web site at http://dfcm.utah.gov. Contractors are responsible for obtaining information contained in each addendum from the web site. Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the bid form. Failure to acknowledge addenda may result in disqualification from bidding.

Submitting Bids: Bids must be submitted to DFCM by the deadline indicated on the schedule. Due to the ongoing construction on Capitol Hill and the anticipated shortage of parking during 2007, all bids will be received at the Wasatch Building at the Utah State Fairpark. Refer to map on the DFCM web site for directions (http://dfcm.utah.gov/downloads/fairpark_map.pdf) Bids submitted after the deadline will not be accepted. Bids will be opened by DFCM on the date, time, and place indicated on the schedule.

Subcontractors List: The firm selected for the project must submit a list of all subcontractors by the deadline indicated on the schedule contained in this document.

Pre-qualified List of Contractors: Contractors shall remain on DFCM's list of pre-qualified contractors provided: (a) they maintain a performance rating of 4 or greater on each project, (b) they are not suspended for failure to comply with requirements of their contract, (c) the firm has not undergone a significant reorganization involving the loss of key personnel (site superintendents, project managers, owners, etc.) to a degree such that the firm no longer meets the pre-qualification requirements outlined in Stage I, (d) the financial viability of the firm has not significantly changed, and (e) the firm is not otherwise disqualified by DFCM. Note: If a contractor fails to comply with items (a) through (e) above,

they may be removed from DFCM's list of pre-qualified contractors following an evaluation by a review committee. Contractors will be given the opportunity to address the review committee before a decision is made. Pre-qualified contractors are ONLY authorized to bid on projects within the discipline that they were originally pre-qualified under.

2. Drawings and Specifications and Interpretations

Drawings, specifications and other contract documents may be obtained as stated in the Invitation to Bid. If any firm is in doubt as to the meaning or interpretation of any part of the drawings, specifications, scope of work or contract documents, they shall submit, in writing, a request for interpretation to the authorized DFCM representative by the deadline identified in the schedule. Answers to questions and interpretations will be made via addenda issued by DFCM. Neither DFCM or the designer shall be responsible for incorrect information obtained by contractors from sources other than the official drawings/specifications and addenda issued by DFCM.

3. Product Approvals

Where reference is made to one or more proprietary products in the contract documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the contract documents, the products of other manufacturers will be accepted, provided they equal or exceed the standards set forth in the drawings and specifications and are compatible with the intent and purpose of the design, subject to the written approval of the Designer. Such written approval must occur prior to the deadline established for the last scheduled addendum to be issued. The Designer's written approval will be included as part of the addendum issued by DFCM. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the Designer.

4. Addenda

All clarifications from DFCM will be in writing and issued as an addendum to the RFS. Addenda will be posted on DFCM's web site at http://dfcm.utah.gov. Contractors are responsible for obtaining information contained in each addendum from the web site. Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the bid form. Failure to acknowledge addenda shall result in disqualification from bidding. DFCM shall not be responsible for incorrect information obtained by contractors from sources other than official addenda issued by DFCM.

5. Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors

Contractors shall respond promptly to any inquiry in writing by DFCM to any concern of financial responsibility of the Contractor, Subcontractor or Sub-subcontractor. Failure to respond may result in suspension from DFCM's list of pre-qualified contractors.

6. Licensure

The Contractor shall comply with and require all of its Subcontractors to comply with the license laws as required by the State of Utah.

7. Time is of the Essence

Time is of the essence in regard to all the requirements of the contract documents.

8. Bids

Before submitting a bid, each bidder shall carefully examine the contract documents; shall visit the site of the work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the contract documents including those added via addenda. If the bidder observes that portions of the contract documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Project Manager prior to the bidding deadline. Changes necessary to correct these issues will be made via addenda issued by DFCM.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Invitation to Bid prior to the published deadline for the submission of bids.

Bid bond security, in the amount of five percent (5%) of the bid, made payable to the Division of Facilities Construction and Management, shall accompany bid. THE BID BOND MUST BE ON THE BID BOND FORM PROVIDED IN THE PROCUREMENT DOCUMENTS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID.

If the bid bond security is submitted on a form other than DFCM's required bid bond form, and the bid security meets all other legal requirements, the bidder will be allowed to provide an acceptable bid bond by the close of business on the next business day following notification by DFCM of submission of a defective bid bond security. **A cashier's check cannot be used as a substitute for a bid bond.**

9. Listing of Subcontractors

Listing of Subcontractors shall be as summarized in the "Instructions and Subcontractor's List Form", included as part of the contract documents. The subcontractors list shall be delivered to DFCM or faxed to DFCM at (801)538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the contract documents.

DFCM retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements may be suspended from DFCM's list of pre-qualified contractors.

10. Contract and Bond

The Contractor's Agreement will be in the form provided in this document. The duration of the contract shall be for the time indicated by the project completion deadline shown on the schedule. The successful bidder, simultaneously with the execution of the Contractor's Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the Contract Sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for Subcontractors will be specified in the Supplementary General Conditions.

11. Award of Contract

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of DFCM to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. DFCM reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc. Alternates will be selected in prioritized order up to the construction cost estimate.

12. Right to Reject Bids

DFCM reserves the right to reject any or all Bids.

13. Withdrawal of Bids

Bids may be withdrawn on written request received from bidders within 24 hours after the bid opening if the contractor has made an error in preparing the bid.

14. DFCM Contractor Performance Rating

As a contractor completes each project, DFCM will evaluate project performance based on the enclosed "DFCM Contractor Performance Rating" form. The ratings issued on this project may affect the firm's "pre-qualified" status and their ability to obtain future work with DFCM.

Stage II
PROJECT SCHEDULE

PROJECT NAME: **QUAD AREA LIGHTING UPGRADE – REDWOOD ROAD CAMPUS**
SALT LAKE COMMUNITY COLLEGE – SALT LAKE CITY, UTAH
DFCM PROJECT #: **06106660**

Event	Day	Date	Time	Place
Stage II Bidding Documents Available	Thursday	March 8, 2007	4:00 PM	Wasatch Building Utah State Fairpark Approx 155 North 1000 West Salt Lake City, UT or DFCM web site *
Mandatory Pre-bid Site Meeting	Tuesday	March 13, 2007	9:00 AM	SLCC/ RRC 4600 So. Redwood Rd. West Valley, Utah Construction Trades Bldg. 2nd Floor Conference room
Deadline for Submitting Questions	Monday	March 19, 2007	2:00 PM	Jim Russell - DFCM E-mail JIMRUSSELL@utah.gov
Addendum Issued Responding to Questions (if needed)	Thursday	March 22, 2007	2:00 PM	DFCM web site*
Prime Contractors Turn in Bid and Bid Bond	Wednesday	March 28, 2007	2:00 PM	Wasatch Building Utah State Fairpark Approx 155 North 1000 West Salt Lake City, UT **
Subcontractors List Due	Thursday	March 29, 2007	2:00 PM	DFCM 4110 State Office Building SLC, UT Fax 801-538-3677
Substantial Completion Date	Monday	October 8, 2007		

* **NOTE: DFCM's web site address is http://dfcm.utah.gov**

** **Due to the ongoing construction on Capitol Hill and the anticipated shortage of parking during 2007, all bids will be received and opened at the Wasatch Building at the Utah State Fairpark. Refer to map on the DFCM web site for directions (http://dfcm.utah.gov/downloads/fairpark_map.pdf)**

BID FORM

NAME OF BIDDER _____ DATE _____

To the Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

The undersigned, responsive to the "Invitation to Bid" and in accordance with the Request for Bids for the **QUAD AREA LIGHTING UPGRADE – REDWOOD ROAD CAMPUS – SALT LAKE COMMUNITY COLLEGE – SALT LAKE CITY, UTAH - DFCM PROJECT NO. 06106660** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: _____

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

_____ DOLLARS ($_____)
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by **October 8, 2007,** should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **$250.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of _____

The undersigned Contractor's License Number for Utah is _____.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract. The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable l00% Performance and Payment bonds are not delivered within time set forth.

Type of Organization: _____
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

_____

Respectfully submitted,

_____
Name of Bidder

ADDRESS:

_____

_____

_____
Authorized Signature

BID BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of $_____ (5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the _____ _____ Project.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

PROVIDED, HOWEVER, that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

DATED this _____ day of _____, 20_____ .

Principal's name and address (if other than a corporation):

_____

_____

By: _____

Title: _____

Principal's name and address (if a corporation):

_____

_____

By: _____

Title: _____

(Affix Corporate Seal)

Surety's name and address:

_____

_____

STATE OF _____)
) ss.
COUNTY OF _____)

By: _____
Attorney-in-Fact (Affix Corporate Seal)

On this ____ day of _____, 20____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.
My Commission Expires: _____
Resides at: _____

_____
NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

INSTRUCTION AND SUBCONTRACTORS LIST FORM

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, on the following basis:

PROJECTS UNDER $500,000 - ALL SUBS $20,000 OR OVER MUST BE LISTED
PROJECTS $500,000 OR MORE - ALL SUBS $35,000 OR OVER MUST BE LISTED

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- Bidder must list "Self" if performing work itself.

LICENSURE:

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

BIDDER LISTING 'SELF' AS PERFORMING THE WORK:

Any bidder that is properly licensed for the particular work and intends to perform that work itself in lieu of a subcontractor that would otherwise be required to be on the subcontractor list, must insert the term 'Self' for that category on the subcontractor list form. Any listing of 'Self' on the sublist form shall also include the amount allocated for that work.

'SPECIAL EXCEPTION':

A bidder may list 'Special Exception' in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A.Section 63A-5-208(4). The bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The Director must find that the bidder complied in good faith with State law requirements for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the Director shall supervise the bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sublist form shall also include amount allocated for that work.

GROUNDS FOR DISQUALIFICATION:

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. If such correction is submitted timely, then the sublist requirements shall be considered met.

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the Director based on complying with all of the following criteria.

(1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
(2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
(3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
(4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
(5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
(6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

EXAMPLE:

Example of a list where there are only four subcontractors:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #
ELECTRICAL	ABCD Electric Inc.	$350,000.00	123456789000
LANDSCAPING	"Self"	300,000.00	123456789000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	298,000.00	987654321000
MECHANICAL	"Special Exception" (attach documentation)	Fixed at: 350,000.00	(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)

PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

SUBCONTRACTORS LIST
FAX TO 801-538-3677

PROJECT TITLE: _____

Caution: You must read and comply fully with instructions.

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #

We certify that:

l. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.
2. We have listed "Self" or "Special Exception" in accordance with the instructions.
3. All subcontractors are appropriately licensed as required by State law.

FIRM: _____

DATE: _____ SIGNED BY: _____

NOTICE: FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR DFCMS REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY DFCM. ATTACH A SECOND PAGE IF NECESSARY.

FUGITIVE DUST PLAN

The Contractor will fill out the form and file the original with the Division of Air Quality and a copy of the form with the Division of Facilities Construction & Management, prior to the issuance of any notice to proceed.

The Contractor will be fully responsible for compliance with the Fugitive Dust Control Plan, including the adequacy of the plan, any damages, fines, liability, and penalty or other action that results from noncompliance.

Utah Division of Air Quality
April 20, 1999

GUIDANCE THAT MUST BE CONSIDERED IN DEVELOPING AND SUBMITTING A DUST CONTROL PLAN FOR COMPLIANCE WITH R307-309-3, 4, 5, 6, 7

Source Information:

1. Name of your operation (source): provide a name if the source is a construction site.

2. Address or location of your operation or construction site.

3. UTM coordinates or Longitude/Latitude of stationary emission points at your operation.

4. Lengths of the project, if temporary (time period).

5. Description of process (include all sources of dust and fugitive dust). Please, if necessary, use additional sheets of paper for this description. Be sure to mark it as an attachment.

6. Type of material processed or disturbed.

7. Amount of material processed (tons per year, tons per month, lbs./hr., and applicable units).

8. Destination of product (where will the material produced be used or transported, be specific, provide address or specific location), information needed for temporary relocation applicants.

9. Identify the individual who is responsible for the implementation and maintenance of fugitive dust control measures. List name(s), position(s) and telephone number(s).

10. List, and attach copies of any contract lease, liability agreement with other companies that may, or will, be responsible for dust control on site or on the project.

Description of Fugitive Dust Emission Activities
(Things to consider in addressing fugitive dust control strategies.)

1. Type of activities (drilling and blasting, road construction, development construction, earth moving and excavation, handling and hauling materials, cleaning and leveling, etc).

2. List type of equipment generating the fugitive dust.

3. Diagram the location of each activity or piece of equipment on site. Please attach the diagram.

4. Provide pictures or drawings of each activity. Include a drawing of the unpaved/paved road network used to move loads "on" and "off" property.

5. Vehicle miles travels on unpaved roads associated with the activity (average speed).

6. Type of dust emitted at each source (coal, cement, sand, soil, clay, dust, etc.)

7. Estimate the size of the release area at which the activity occurs (square miles). For haul or dirt roads include total miles of road in use during the activity.

Description of Fugitive Dust Emission Controls on Site

Control strategies must be designed to meet 20% opacity or less on site (a lesser opacity may be defined by Approval Order conditions or federal requirements such as NSPS), and control strategies must prevent exceeding 10% opacity from fugitive dust at the property boundary (site boundary) for compliance with R307-309-3.

1. Types of ongoing emission controls proposed for each activity, each piece of equipment, and haul roads.

2. Types of additional dust controls proposed for bare, exposed surfaces (chemical stabilization, synthetic cover, wind breaks, vegetative cover, etc).

3. Method of application of dust suppressant.

4. Frequency of application of dust suppressant.

5. Explain what triggers the use of a special control measure other than routine measures already in place, such as covered loads or measures covered by a permit condition (increase in opacity, high winds, citizen complaints, dry conditions, etc).

6. Explain in detail what control strategies/measures will be implemented off-hours, i.e., Saturdays/Sundays/Holidays, as well as 6 PM to 6 AM each day.

Description of Fugitive Dust Control Off-site

Prevent, to the maximum extent possible, deposition of materials, which may create fugitive dust on public and private paved roads in compliance with R307-309-5, 6, 7.

1. Types of emission controls initiated by your operation that are in place "off" property (application of water, covered loads, sweeping roads, vehicle cleaning, etc.).

2. Proposed remedial controls that will be initiated promptly if materials, which may create fugitive dust, are deposited on public and private paved roads.

Submit the Dust Control Plan to:

Executive Secretary
Utah Air Quality Board
POB 144820
15 North 1950 West
Salt Lake City, Utah 84114-4820

Phone: (801) 536-4000
FAX: (801) 536-4099

Fugitive Dust Control Plan Violation Report

When a source is found in violation of R307-309-3 or in violation of the Fugitive Dust Control Plan, the course must submit a report to the Executive Secretary within 15 days after receiving a Notice of Violation. The report must include the following information:

1. Name and address of dust source.

2. Time and duration of dust episode.

3. Meteorological conditions during the dust episode.

4. Total number and type of fugitive dust activities and dust producing equipment within each operation boundary. If no change has occurred from the existing dust control plan, the source should state that the activity/equipment is the same.

5. Fugitive dust activities or dust producing equipment that caused a violation of R-307-309-3 or the sources dust control plan.

6. Reasons for failing to control dust from the dust generating activity or equipment.

7. New and/or additional fugitive dust control strategies necessary to achieve compliance with R307-309-3, 4, 5, 6, or 7.

8. If it can not be demonstrated that the current approved Dust Control Plan can result in compliance with R307-309-3 through 7, the Dust Control Plan must be revised so as to demonstrate compliance with 307-309-3 through 7. Within 30 days of receiving a fugitive dust Notice of Violation, the source must submit the revised Plan to the Executive Secretary for review and approval.

Submit the Dust Control Plan to:

Executive Secretary
Utah Air Quality Board
POB 144820
15 North 1950 West
Salt Lake City, Utah 84114-4820

Phone: (801) 536-4000
FAX: (801) 536-4099

Attachments: DFCM Form FDR R-307-309, Rule 307-309

CONTRACTOR'S AGREEMENT

FOR:

_____
_____
_____

THIS CONTRACTOR'S AGREEMENT, made and entered into this ____ day of _____, 20__, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and _____, incorporated in the State of _____ and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is _____.

WITNESSETH: WHEREAS, DFCM intends to have Work performed at _____ _____.

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, DFCM and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

ARTICLE 1. SCOPE OF WORK. The Work to be performed shall be in accordance with the Contract Documents prepared by _____ and entitled "_____."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

ARTICLE 2. CONTRACT SUM. The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of _____ _____ DOLLARS AND NO CENTS ($_____.00), which is the base bid, and which sum also includes the cost of a 100%

Performance Bond and a 100% Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete by _____. Contractor agrees to pay liquidated damages in the amount of $_____ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its or Subcontractor or suppliers at any tier, against the DFCM or State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, in which to complete the Work under this Contractor's Agreement in accordance with the General Conditions.

ARTICLE 4. CONTRACT DOCUMENTS. The Contract Documents consist of this Contractor's Agreement, the Conditions of the Contract (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Notice to Contractors, Instructions to Bidders/Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor's Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

ARTICLE 5. PAYMENT. The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the

Contractor requests payment and agrees to safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor's obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

ARTICLE 6. INDEBTEDNESS. Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by DFCM to Contractor.

ARTICLE 7. ADDITIONAL WORK. It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The DFCM specifically reserves the right to modify or amend this Contractor's Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

ARTICLE 8. INSPECTIONS. The Work shall be inspected for acceptance in accordance with the General Conditions.

ARTICLE 9. DISPUTES. Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. DFCM reserves all rights to pursue its rights and remedies as provided in the General Conditions.

ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT. This Contractor's Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

ARTICLE 11. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF. The DFCM may withhold from payment to the Contractor such amount as, in DFCM's judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

ARTICLE 12. INDEMNIFICATION. The Contractor shall comply with the indemnification provisions of the General Conditions.

ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT. The DFCM and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor's Agreement. The Contractor shall not assign this Contractor's Agreement without the prior written consent of the DFCM, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor's Agreement, without prior written consent of the DFCM.

ARTICLE 14. RELATIONSHIP OF THE PARTIES. The Contractor accepts the relationship of trust and confidence established by this Contractor's Agreement and covenants with the DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; to furnish efficient business administration and supervision; to make best efforts to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the DFCM.

ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT. Contractor and DFCM each represent that the execution of this Contractor's Agreement and the performance thereunder is within their respective duly authorized powers.

ARTICLE 16. ATTORNEY FEES AND COSTS. Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor's Agreement or recover damages or any other action as a result of a breach thereof.

IN WITNESS WHEREOF, the parties hereto have executed this Contractor's Agreement on the day and year stated hereinabove.

CONTRACTOR: _____

_____
Signature Date

Title: _____

State of _____)
)
County of _____) _____
Please type/print name clearly

On this ____ day of _____, 20____, personally appeared before me, _____, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the _____ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

_____
Notary Public

(SEAL)

My Commission Expires _____

APPROVED AS TO AVAILABILITY OF FUNDS:

_____
David D. Williams, Jr. Date
DFCM Administrative Services Director

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

_____
_____ - Manager Date
Capital Development/Improvements

APPROVED AS TO FORM:
ATTORNEY GENERAL
November 30, 2006
By: Alan S. Bachman
Asst Attorney General

APPROVED FOR EXPENDITURE:

_____
Division of Finance Date

PERFORMANCE BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That _____ hereinafter referred to as the "Principal" and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee, " in the amount of _____ _____ DOLLARS ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____, for the approximate sum of _____ _____ Dollars ($_____), which Contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20_____.

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____

(Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)

) ss.

COUNTY OF _____)

On this _____ day of _____, 20____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.

My commission expires: _____

Resides at: _____

_____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

PAYMENT BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and _____ _____, a corporation organized and existing under the laws of the State of _____authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of _____, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of _____ Dollars ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____ for the approximate sum of _____ _____ Dollars ($_____), which contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, l953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____

(Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20____, personally appeared before me _____ _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.

My commission expires: _____

Resides at: _____

_____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

CHANGE ORDER #_____

CONTRACTOR:

ARCHITECT:

AGENCY OR INSTITUTION:
PROJECT NAME:
PROJECT NUMBER:
CONTRACT NUMBER:
DATE:

CONSTRUCTION CHANGE DIRECTIVE NO.	PROPOSAL REQUEST NO.	AMOUNT		DAYS	
		INCREASE	DECREASE	INCREASE	DECREASE

	Amount	Days	Date
ORIGINAL CONTRACT			
TOTAL PREVIOUS CHANGE ORDERS			
TOTAL THIS CHANGE ORDER			
ADJUSTED CONTRACT			

DFCM and Contractor agree that the terms, contract sum, scope of the Work and time specified in this Change Order shall constitute the full accord and satisfaction, and complete adjustment to the Contract and includes all direct and indirect costs and effects related to, incidental to, and/or reasonably implied from such change in the contract terms, sum, scope of the Work and time.

Contractor:_____
Date

Architect/Engineer:_____
Date

Agency or Institution:_____
Date

DFCM: _____
Date

Funding Verification:_____
Date

Page _____ of _____page(s)

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT _____ PROJECT NO: _____

AGENCY/INSTITUTION _____

AREA ACCEPTED _____

The Work performed under the subject Contract has been reviewed on this date and found to be Substantially Completed as defined in the General Conditions; including that the construction is sufficiently completed in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the State of Utah can occupy the Project or specified area of the Project for the use for which it is intended.

The DFCM - (Owner) accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at _____ (time) on _____ (date).

The DFCM accepts the Project for occupancy and agrees to assume full responsibility for maintenance and operation, including utilities and insurance, of the Project subject to the itemized responsibilities and/or exceptions noted below:

_____

_____

The Owner acknowledges receipt of the following closeout and transition materials:

☐ Record Drawings ☐ O & M Manuals ☐ Warranty Documents ☐ Completion of Training Requirements

A list of items to be completed or corrected (Punch List) is attached hereto. The failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents, including authorized changes thereof. The amount of_____. (Twice the value of the punch list work) shall be retained to assure the completion of the punch list work.

The Contractor shall complete or correct the Work on the list of (Punch List) items appended hereto within _____ ____calendar days from the above date of issuance of this Certificate. If the list of items is not completed within the time allotted the Owner has the right to be compensated for the delays and/or complete the work with the help of independent contractor at the expense of the retained project funds. If the retained project funds are insufficient to cover the delay/completion damages, the Owner shall be promptly reimbursed for the balance of the funds needed to compensate the Owner.

_____ by: _____

CONTRACTOR (include name of firm) (Signature) DATE

_____ by: _____

A/E (include name of firm) (Signature) DATE

_____ by: _____

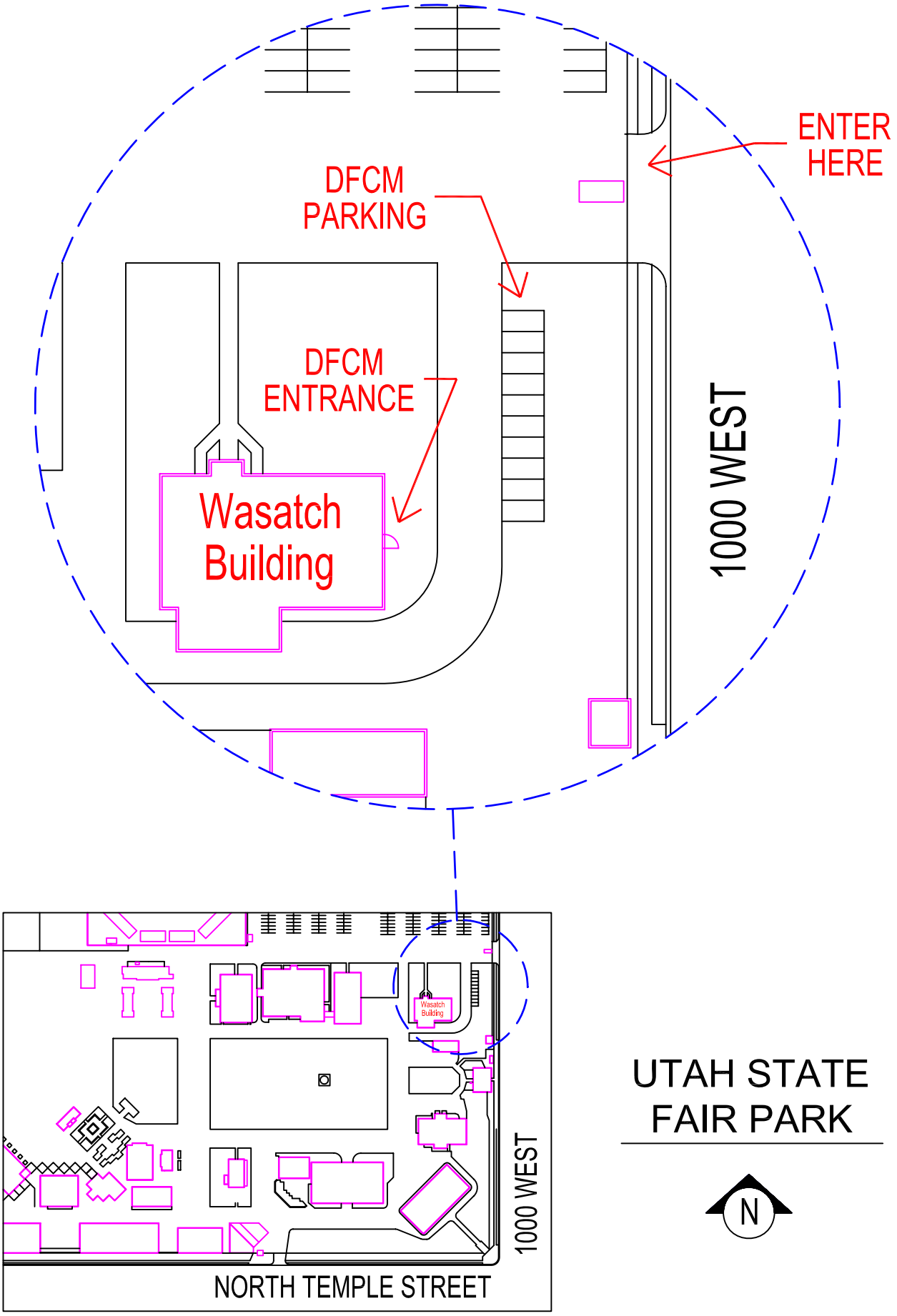
USING INSTITUTION OR AGENCY (Signature) DATE

_____ by: _____

DFCM (Owner) (Signature) DATE

4110 State Office Building, Salt Lake City, Utah 84114
telephone 801-538-3018 • facsimile 801-538-3267 • http://dfcm.utah.gov

cc: Parties Noted
DFCM, Director



DFCM Temporary Location

TECHNICAL SPECIFICATIONS INDEX

END OF TECHNICAL SPECIFICATION INDEX

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions, Supplemental General Conditions and other Division 1 Specification Sections apply to work of this section.

1.2 PROJECT DESCRIPTION

A. The Project consists of replacement of Exterior Lighting and Interior Lighting Control Systems at Salt Lake Community College, Redwood Road Campus, 4600 South Redwood Road, Salt Lake City, Utah, as described by the Contract Documents prepared by Thomas & Kolkman Engineering Company Inc..

B. The Work consists providing new work and alterations to the existing facilities and systems necessary for installation and proper operation of the work including, but not limited to the following:

1. New light poles and fixtures complete with concrete bases, electrical circuit connections, and controls in the Quad Area.

2. Removal of existing light poles, fixtures, concrete bases, and electrical circuit connections in the Quad Area.

3. Replacement of existing interior lighting control systems in the Library, Lifetime Activity Center, and Science/Industry buildings including control switches and control wiring.

4. Demolition and repair of the existing site and buildings, limited to the extent required to install the above work.

5. Incidental items required to complete the work even though not specifically indicated.

1.3 CONTRACTOR USE OF PREMISES

A. The Contractor will have limited use of areas included in the scope of the work as required for storage and construction operations. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

1. The Contractor may have limited use of the mechanical rooms, electrical room, or similar spaces in each building involved in the project, as approved by Salt Lake Community College, during the construction period for material storage not accommodated in the work areas. These areas are not secure and it will be the responsibility of the contractor to provide additional measures to secure stored materials, tools, and equipment. Material storage will not in any way interfere with the normal building operations or interfere with access or working clearance in the existing mechanical room and generator enclosure.

B. Staging area will be made available to the contractor in the parking lot. Maximum 4 parking spaces will be available. Coordinate exact location with SLCC Facilities Project Manager. Contractor to provide suitable barricades to protect staging area and passersby. Barricades will not impede traffic flow.

C. Contractor may use existing building restrooms during the construction period. Restrooms are to be kept clean. The Owner reserves the right to require the Contractor to furnish portable toilet facilities if the Contractor fails to keep building restroom clean.

D. Keep driveways and entrances serving the premises clear and available to the Owner and the

Owner's employees at all times. Do not use these areas for parking or storage of materials except as specifically allowed by the Owner. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

E. Barricade all areas of excavation as necessary to protect passersby. Barricades in areas of sidewalks will not reduce the clear path of the sidewalk by more than 50%, unless approved otherwise by the Owner.

F. Maintain the existing building in a weathertight condition throughout the construction period. Repair all damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.4 WORK SCHEDULING

A. The Owner will occupy the existing buildings during the entire construction period. The Work will be scheduled with the least possible interference to the activities of the Owner's personnel. Cooperate with the Owner during construction operations to minimize conflicts with Owner's usage. Coordinate the construction sequencing and schedule with the Owner and Engineer.

1.5 PROJECT SUPERINTENDENT

A. The contractor shall assign a Project Superintendent to supervise and coordinate all constructions activities. Submit the name of the Project Superintendent at, or prior to, the pre-construction meeting along with telephone numbers and other contact information.

B. The Project Superintendent shall be present at the project site at all time work is being performed including work by subcontractors and/or vendors.

1.6 GUARANTEE/WARRANTY

A. Notwithstanding other guarantees or warranties for specific components, The Contactor shall Warranty the entire work included in the Contract for a period of One (1) Year from the date of issuance of the Certificate of Substantial Completion against all defects in equipment, material and workmanship.

B. Furnish and pay for all labor, equipment and material required to correct defects and deficiencies in the work without additional cost to the Owner and as approved by the Owner and Architect.

C. In addition to the general project warranty, specific project warranties are required and are noted in the indicated Specification Sections.

D. Provide all incidental product warranties which are available from manufacturers at no additional cost to the Owner.

E. Submit all warranties in binders which are indexed, tabbed and labeled.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

* END OF SECTION 01010 *

SECTION 01030 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions, Supplemental General Conditions and other Division 1 Specification Sections apply to work of this section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for Alternates.

B. Definition: An Alternate is an amount proposed by Bidders and stated on the bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.

C. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project. The cost of coordination of the alternate work shall be addressed in the alternate pricing.

D. Notification: Immediately following award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.

E. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each Alternate.

1. Include as part of each Alternate, miscellaneous devices, accessory objects, repairs and similar items incidental to or required for a complete installation whether or not specifically mentioned as part of the Alternate.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Additive Alternate No. 1: Replace Science/Industry Lighting Control System.

1. Replace all existing Lighting Relay Panels in the Science/Industry building including all associated control wiring, control devices, etc., as shown on Sheets EL106 and EL107 of the drawings.

B. Additive Alternate No. 2: Lighting Control System Network.

1. Provide desktop computer with peripherals, cabling, programming, etc., to network the individual lighting control systems in each building as shown on Sheet EL108 of the drawings.

2. Provide necessary upgrades to individual lighting relay panels to be compatible with the network.

* END OF SECTION 01030 *

SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and other Division 1 Specification Sections apply to work of this section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:

1. Pre-Construction Conference
2. Coordination/Progress meetings

1.3 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction conference and organizational meeting at the Project Site or other convenient location prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

B. Attendees: The Owner, Engineer, the Contractor and its superintendent, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule.
2. Critical Work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of Shop Drawings and Product Data.
8. Preparation of Record Documents.
9. Use of the premises.
10. Working Hours.
11. Work and Storage Areas.
12. Equipment deliveries and priorities.
13. Safety procedures.
14. Security.
15. Sexual Harassment.
16. Housekeeping.

1.4 COORDINATION/PROGRESS MEETINGS

A. Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved.

1. Meetings will be conducted weekly unless otherwise agreed upon by Owner, Engineer and Contractor.

B. The Owner, Engineer, the Contractor and/or its superintendent, and other parties currently involved in coordination or planning for the construction activities involved will be represented at each meeting.

C. The Engineer will record meeting results and distribute copies to everyone in attendance and to others affected by decisions resulting from each meeting.

D. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments for parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including such items as:

a. Interface requirements.
b. Time.
c. Sequences.
d. Deliveries.
e. Off-Site fabrication problems.
f. Access.
g. Site utilization.
h. Temporary facilities and services.
i. Hours of work.
j. Hazards and risks.
k. Housekeeping.
l. Quality and Work standards.
m. Change Orders.
n. Documentation of information for Payment Requests.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

* END OF SECTION 01200 *

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and other Division 1 Specification Sections apply to work of this section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Job Site Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final Cleaning.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date of Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

    a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

3. Submit record drawings, maintenance manuals, damage or settlement survey, property survey, and similar final record information.

4. Deliver tools, spare parts, extra stock, and similar items.

5. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

6. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedure: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. General: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected. The certified copy of the list shall state that each item has been completed, or otherwise resolved for acceptance and shall be endorsed and dated by the Engineer.

B. Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Engineer.

1.5 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to shown the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.

3. Note related change order numbers where applicable.

4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

1.6 OPERATION & MAINTENANCE MANUALS SUBMITTALS

A. Provide 4 sets of Operation and Maintenance Manuals unless otherwise directed by the Owner and/or Project Engineer.

B. Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 3-ring, vinyl-covered binders, with pockets folders for folded sheet information, and properly sized for the amount of materials.

1. Folding tab sheet folders are not acceptable.

C. Include project identification on the front cover of each set to include, but not be limited to, the following information:

1. Project Name as it appears on the contract documents.
2. Owner’s Project Number.
3. Contractor’s name, address, telephone, fax, and other pertinent information.
4. Project Engineer’s name, address, telephone, fax, and other pertinent information.

D. Include the Project Name as it appears on the contract documents and the Owner’s Project Number on the back spine of each set.

E. Include the following types of information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring Diagrams.
5. Recommended "turn around" cycles.
6. Inspection Procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representative if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record Documents.
3. Spare Parts and materials.
4. Tools.
5. Lubricants.
6. Identification systems.
7. Control sequences.
8. Hazards.
9. Cleaning.
10. Warranties and Bonds.
11. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Shutdown.
3. Noise and vibration adjustments.
4. Safety Procedures.

3.2 FINAL CLEANING

A. The General Conditions require general cleaning during construction.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and

maintenance program. Comply with manufacturer's instructions.

1. Remove labels that are not permanent labels.

2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

4. Clean the site including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess material on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

* END OF SECTION 01700 *

SECTION 02100 - GENERAL SITE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and Division 1 Specification Sections apply to work of this section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for general site work including but not limited to:

1. Examination.
2. Preparation.
3. Repair and Restoration.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS

A. Prior to performing any excavation, obtain current utility plan indicating approximate location of known underground utilities from Salt Lake Community College (SLCC) Facilities Division.

B. Contractor may pothole to verify location of existing underground utilities as deemed necessary by the contractor. No additional allowance will be made by the Owner to the contractor for potholing performed by the contractor.

C. Upon discovery of conflicts or problems with existing facilities, notify the Project Engineer by telephone or fax within 24 hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PROTECTION

A. Spillage -

1. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.

2. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.

B. Dust Control -

1. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.

2. Correct or repair damage caused by dust.

C. Erosion Control -

1. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.

2. Develop, install, and maintain an erosion control plan if required by law.

3. Repair and correct damage caused by erosion.

D. Existing Plants & Features -

1. Do not damage tops, trunks, and roots of existing trees and shrubs on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Engineer and Owner.

2. Do not damage other plants and features which are to remain.

E. If specified precautions are not taken or corrections and repairs are not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of the Work.

3.3 REPAIR AND RESTORATION

A. Adjust existing covers, boxes, and vaults to grade.

B. Replace broken or damaged covers, boxes, and vaults.

C. Independently confirm size, location, and number of covers, boxes, and vaults which require adjustment.

3.4 FIELD QUALITY CONTROL

A. If work has been interrupted by weather, scheduling, or other reason, notify Engineer 24 hours minimum prior to intended resumption of grading or compacting.

B. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils which have been exposed to adverse weather conditions.

* END OF SECTION 02100 *

SECTION 02170 - GRASS SOD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and Division 1 Specification Sections apply to work of this section.

B. Section 02200 - Earthwork applies to work of this section.

1.2 SCOPE OF WORK

A. Provide all grass sod, labor, materials, and equipment necessary for replacement of existing grass sod removed, disturbed or damaged by construction activities including, but not limited to, the following:

1. Installation of new underground utilities and structures.

2. Damage caused by vehicular traffic on lawn areas.

a. Lawn areas will be considered as damaged where wheel tracks or other depressions are more than 1" below adjacent lawn areas or where lawn areas becomes muddy and unstable after normal watering.

1.3 QUALITY ASSURANCE

A. All workers performing work of this section shall be thoroughly trained and experienced in the necessary crafts and be completely familiar with the specified requirements and the methods of the work of this section.

1.4 INSPECTIONS

A. All new sod will be inspected upon delivery to site by Owner and/or Project Engineer. Any material that is not approved for use must be removed from site immediately and replaced with acceptable material.

1.5 JOB CONDITIONS

A. Visit the site and be familiar with all existing conditions and extent of work performed by other contractors on the site.

B. Obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them so that work can be made without delaying the project.

C. Refer to drawings and compare locations of trees, shrubs, piping and existing utilities in order to avoid unnecessary damage to existing underground irrigation system and utilities.

PART 2 - PRODUCTS

2.1 GRASS SOD

A. Grass sod removed from areas of excavation may be used for installation upon completion of backfilling only as follows:

1. Carefully remove existing grass sod prior to excavation. Cut grass sod to a minimum depth of 1-1/2" or as required to obtain sufficient root structure for regrowth.

2. Store removed grass at the project site in a location acceptable to the Owner.

3. Maintain the stored grass sod in a healthy and live condition by regular watering and protection from construction activities.

4. Grass sod that has been allowed to partially die or that is otherwise not equal to new grass sod shall be deemed unacceptable and be removed from the project site.

B. Provide new grass sod for all lawn areas not covered by salvaged grass sod.

1. New grass sod shall be two year old Kentucky Blue Grass that has been cut fresh not more than 24 hours prior to installation.

2. Use only new grass sod that has been grown in a commercial sod farm. Do not use grass sod from any other source.

3. New grass sod that has not been laid within 24 hours shall be deemed unacceptable and be removed from the site.

2.2 FERTILIZER

A. Commercial fertilizer shall be a mixed commercial fertilizer, O-F-241C, type 1, grade 16-16-8, level B with guaranteed chemical analysis of contents marked on the containers.

2.3 TOPSOIL

A. Excavated material free from subsoils, hard clods, stiff clay, hard-pan, sod, partially disintegrated debris and any other undesirable material may be used for topsoil.

1. Subsoils are expected to be gravelly and are not acceptable for topsoil. Contractor will be required to remove existing topsoil prior to excavation and stockpile the removed topsoil at the project site in a location acceptable to the Owner.

B. Where existing topsoil is not stockpiled by the contractor or is otherwise not acceptable for topsoil, provide new imported topsoil as follows:

1. Imported topsoil shall consist of natural sandy loam and be of uniform quality, free from subsoil, hard clods, stiff clay, hard-pan, sod, partially disintegrated debris of any other undesirable material including plants, roots, or seeds that would be toxic or harmful to growth.

2. Topsoil shall be obtained from naturally drained areas and shall contain at least 4 per cent organic material as determined by loss upon ignition of a moisture free sample that has been dried in accordance with current methods of the Association of Official Agricultural Chemists. Acidity range shall be 5.5 to 7.7 inclusive.

PART 3 - EXECUTION

3.1 GENERAL

A. Perform all operations in connection with the installation of grass sod in strict accordance with this section of the specifications and the applicable drawings.

B. Landscape work shall be suspended at any time when it may be subject to damage by climatic conditions. However, no substantial work suspension may be made without written permission of the Project Engineer.

3.2 PREPARATION OF SUBGRADE

A. Inspect subgrade for any deleterious material including all rocks, clods and litter that is larger in diameter than specified.

B. Correct any deficiencies in the subgrade including low spots, unevenness, and poor drainage areas due to improper grading or leveling prior to the installation of topsoil.

C. Subgrade shall be 5-1/2" below finish grade in all cases to insure a uniform depth of 4" for topsoil and 1-1/2" for sod.

3.3 INSTALLATION

A. When construction has been completed to a point where the areas will not be disturbed, subgrade shall be cleaned free of waste material of all kinds. Till and pulverize the subgrade to a depth of not less than 4 inches. Tilling shall be completed in all areas that are to receive plant materials whether it is to be grass sod or shrubs.

B. Distribute topsoil to a depth of 4 inches over all sodded areas under the contract. Do not place topsoil over subgrade that is frozen or damp.

C. The surface of the topsoil shall be fine graded. The surface shall be firm and free from footprints, depressions or undulations of any kind. The surface shall be free of all materials larger than 1/2" in diameter. Smooth shall be considered to be within 1/2 inch plus or minus of existing adjacent surfaces.

D. The finish grade of the topsoil adjacent to all sidewalks, mowstrips, etc., and prior to the laying of the sod, shall be 1-1/2" below the top surface of the concrete or hard surface.

E. Prior to laying of sod, the entire surface to receive sod shall be uniformly covered with the specified chemical fertilizer at the rate of 5 pounds per 1000 square feet.

F. Upon completion of the laying operation, an inspection of the area shall be made. All voids and large cracks between individual pieces of sod shall be filled with topsoil, prior to watering.

G. Watering of the sod shall be the complete responsibility of the contractor by whatever means necessary to establish the sod in an acceptable manner prior to acceptance by the owner. An existing irrigation system is in place on the site, but if for whatever reason, water is not available in the system, it is the full responsibility of the contractor to water the sod by other acceptable means, until the sod is accepted by the Owner.

H. Upon completion of filling all voids in the newly laid sod areas, the sod is to be completely saturated with water.

I. Protection of the newly laid sod shall be the complete responsibility of the contractor. Provide acceptable visual barriers by means of barricades set at appropriate distances and strings or tapes between the barriers as an indication of new work. Restore any damaged areas caused by others, erosion or vehicular traffic until such a time as the lawn is accepted by the owner.

J. The contractor shall keep the site free from accumulation of waste material. At the time of completion, all areas must be swept or washed clean and all rubbish removed to the satisfaction of the Project Engineer.

3.4 GUARANTEE

A. The contractor shall be responsible for the protection, watering, weed control, and replacement of any damaged sod until acceptance by the Owner. This guarantee shall include the filling of any voids between sod pieces, removal and replacement of any deficient sod, repairing of any eroded

or damaged areas and maintaining the sod by watering, mowing and controlling of insects and weeds, as well as advising the owner of any maintenance or watering procedures necessary to care for and promote plant life. All sod must be in satisfactory condition at the time of the final inspection.

* END OF SECTION 02170 *

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of earthwork is indicated on the drawings.

1. Preparation of subgrade for equipment foundations, walks, and pavements is included as part of this work.

2. Drainage fill course for support of equipment foundations and walks is included as part of this work.

3. Backfilling of utility trenches is included as part of this work.

B. Excavation for Electrical Work: Refer to Division 16 sections for excavation and backfill required in conjunction with underground electrical utilities and buried electrical appurtenances.

C. Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal or redistribution of materials removed.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service: Owner may engage soil testing and inspection service as recommended by the Engineer for quality control testing during earthwork operations.

1.4 JOB CONDITIONS

A. Locate existing underground utilities in areas of work. Provide adequate support and protection during earthwork operations for existing utilities to remain in place.

1. Should uncharted or incorrectly charted piping or other utilities be encounter during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of the utility owner.

2. The locations of existing underground utilities depicted on the drawings are shown in an approximate way only. Determine the exact location of all existing utilities, whether or not shown on the drawings before commencing work. Contractor will be responsible for any and all damages which might be occasioned by failure to exactly locate and preserve any and all underground utilities. If damaged or removed, the existing utility shall be restored or replaced by contractor in as nearly the original condition and location as is reasonably possible.

B. Locate and protect survey reference lines, bench marks and monuments.

1. If survey control lines or monuments are destroyed or altered as a consequence of construction, replace as directed, at no cost to the Owner.

C. Barricade open excavations occurring as part of this work and post with warning lights as required for protection of persons and property.

1. Operate warning lights as recommended by the authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements and other facilities indicated to remain from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW and SP.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT.

C. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.

D. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

E. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

F. Structural Fill: Structural fill will be required as backfill over utilities and as structural site grading fill. All structural fill should be free of sod, rubbish, construction debris, frozen soil, and other deleterious materials.

G. Granular subbase under pavements: See structural site grading fill above.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed the Engineer, shall be at Contractor's expense.

C. Excavation for Pavements: Cut surface under pavement to comply with cross-sections, elevations and grades as shown.

D. Excavation for Electrical Utility Trenches: dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room.

1. Excavate trenches to depth indicated or required.

2. Hand excavate bottom cut to accurate elevations to evenly support conduit on undisturbed soil. 0ver-excavate and fill bottom of trench with select backfill material where undisturbed soil is not suitable for conduit support.

3. See Division 16 Specifications for additional requirements.

E. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35^0 F (1^0 C).

3.2 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well defined moisture density relation ship (cohesive soils) determined in accordance with ASTM D 1557; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

1. Structures, Equipment Foundations, and Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesive material or 95% relative density for cohesionless material.

2. Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive materials and 90% relative density for cohesionless soils.

3. Lawn Areas: Compact top 12" of subgrade backfill or fill material at 85% maximum density.

4. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesive materials and 95% relative density for cohesionless materials.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

a. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3 BACKFILL AND FILL

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

1. In excavations, use satisfactory excavated or borrow material.

2. Under grassed areas, use satisfactory excavated or borrow material.

3. Under walks and pavement, use subbase material, or satisfactory excavated or borrow material or combination of both.

4. Under piping and conduit use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90^0 of cylinder.

B. Cleanup: Remove all rocks, gravel, excess soil, and other deleterious matter from all lawn areas used for placement of borrow material or otherwise affected by excavation and backfill operations.

3.4 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grade.

B. Finish surfaces free from irregular surface changes, and as follows:

1. Lawn or Unpaved Areas: Finish areas including topsoil to within not more than 0.10' above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.

C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum density for each area classification.

3.5 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded area from traffic and erosion. Keep free of trash and debris.

1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape and compact to required density prior to further construction.

C. Settling: Where settling is measurable or observable at excavated areas during general project period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible.

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it legally off Owner's property.

* END OF SECTION 02200 *

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and Supplemental General Conditions apply to work of this section.

B. Section 16000 - General Provisions, Electrical

1.2 SCOPE

A. Work Included: Cast-in-place concrete required for this work is indicated on the Drawings and includes, but not necessarily limited to:

1. Exterior flat work and light pole bases.

1.3 QUALIFICATIONS

A. Provide at least one person who shall be present at all times during execution of this portion of the work, who shall be thoroughly trained and experienced in placing the type of concrete specified, and who shall direct all work performed under this Section. For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeymen concrete finishers.

1.4 CODES AND STANDARDS

A. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations of the following American Concrete Institute Publications: (unless higher standards are called for by these Specifications or applicable governing codes and regulations).

1. ACI 347-78 Recommended Practice for Concrete Formwork.
2. ACI 315-80 Manual of Standard Practice for Detailing Reinforced Concrete Structures.
3. ACI 318-86 Building Code Requirements for Reinforced Concrete.
4. ACI 301-72 Structural Concrete for Buildings.

B. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent provision shall govern.

1.5 SUBMITTALS

A. Transit-Mix Delivery Slips (Contract Delivery Tickets):

1. The following information shall be furnished on each delivery ticket for each load of ready-mix concrete:

a. Number of cubic yards.

b. The exact amount of cement. (This can be indicated either by weight or quantity.)

c. The amount of mixing water, including moisture in the aggregate. (This can be indicated either by weight or quantity.)

d. If water is added at the job site (only when allowed by the Engineer), note the amount and time it was added.

e. Amount of slump in inches.

f. Type of cement.

g. Do the aggregates meet ASTM specified.....yes or no; indicate maximum size aggregate.

h. All tickets shall be given to the Engineer, and if not on the job site, the superintendent shall obtain these tickets and see that they are held for the Engineer in a particular file so they are readily available upon request. Note the exact location of the concrete on the job. The Owner shall be allowed to review tickets at any time.

i. Date of cast.

j. Percent of air entrainment.

1.6 PROJECT HANDLING

A. Protection: Use all means necessary to protect cast-in-place concrete materials before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to Owner.

1.7 TESTING AND INSPECTION

A. Testing and inspection of concrete and materials may be made under the direction of a Testing Agency, hired by the Owner, who shall have access to all places where concrete materials are stored, proportioned, mixed or placed.

B. Tests of concrete and materials shall be made by an independent testing and inspection laboratory selected by the Contractor from the Owner's approved list.

C. Unless otherwise directed by the Engineer, three test cylinder specimens per 10 cu. yards, or each day's pour, shall be made and cured for each test taken in accordance with current ASTM Specification C 31. Slump test shall be made on each batch tested in accordance with current ASTM Designation C 138. Copies of each test shall be mailed to the Engineer, Owner and Contractor.

D. Test Report shall include the following:
   1. Age of test.
   2. Number of days cured in the field.
   3. Percentage of air entrainment.
   4. Location of pour from which test was taken.
   5. Concrete temperature.
   6. Date cylinder was cast.

1.8 GUARANTEE

A. The Contractor shall guarantee in writing, to the Owner, in a form approved by the Engineer, all materials and workmanship of concrete work to be free of defects for a period of five years from the Date of Substantial Completion as directed by the General Conditions. The Contractor shall promptly remove and/or repair defective concrete as directed by Owner and at the Contractor's expense. New replacement work shall also carry a similar five year written guarantee. Spalling, pitting and crazing of concrete shall be considered defective work.

PART 2 - PRODUCTS

2.1 CONCRETE

A. General: All concrete, unless otherwise specifically permitted by the Engineer, shall be transit-mixed in accordance with ASTM C 94-84, except where a higher standard is called for.

B. Mix Design: Prior to the placement of any concrete, the Contractor, at the Contractor's expense, shall provide the concrete mix and certification from an independent laboratory that the design is in accordance with ACI-613 and these Specifications with respect to workability, minimum strength and minimum segregation of materials.

C. Quality:

1. All concrete shall have the following minimum compressive strengths at 28 days and shall be proportioned within the following limits: CONCRETE DELIVERY SLIPS SHALL SHOW THESE MINIMUM CEMENT QUANTITIES:

Location concrete	Min. psi 28 days	Max. size aggregate	Min. sacks of cement/cu. yd	Max. slump in inches
Footing Found.	3000	3/4 inch	6	3
All other concrete	4000 *	3/4 inch	6-1/2	3

* Air entrainment per C260

2. Concrete that is subject to freezing temperatures while wet shall have water-cement ratio not exceeding five gallons per sack and shall contain entrained air. (Moisture is aggregates considered as mix water.)

D. Cement: All cement shall be Portland Cement, Type II, low alkali and shall be the product of one manufacturer; the temperature of cement delivered to plant shall not exceed 150 degrees F. The alkali content of the cement calculated as sodium oxide shall not exceed .75%.

E. Aggregates: All aggregates shall conform to ASTM C-33-78, except as modified herein.

F. Water: All water shall be clean and free from deleterious matter.

G. Admixture: For all concrete exposed to weather, except floor slabs, use ASTM C-260 as follows:

Maximum Aggregate Size	Per cent Air
3/4 inch	6-1/2 +/- to 1-1/2%

H. Fly ash shall not exceed 10% of cement by weight.

2.2 FORM MATERIALS

A. Form Lumber: All form lumber in contact with exposed concrete shall be new except all allowed for re-use for forms in PART 3.00 of these Specifications, and all form lumber shall be one of the following, a combination thereof, or an equal approved by Engineer.

1. "Plyform" class I or II, bearing the label of the American Plywood Association. (APA)

2. Douglas Fir-Larch, number two grade, seasoned, surface four sides.

B. Forms:

1. Metal forms may be used at the option of the Contractor.

2. Forms shall be the full depth of the concrete thickness when forming for slabs on grade. (See Drawings for the required thickness of slabs.)

3. Coating: All concrete forms shall be coated before erection with a compound which prevents a bond, leaving a flat finish on the concrete that will not affect the bonding properties of subsequent cement or paint coatings.

C. Ties and Spreaders:

1. Type: All form ties shall be of a type which does not leave an open hole through the concrete.

2. Design: When forms are removed all metal shall not be less than one inch from the surface.

3. Wire Ties and Wood Spreaders: Do not use wire or wood spreaders.

2.3 CONCRETE REINFORCEMENT

A. All concrete reinforcement materials shall be new, free from rust and complying with the following reference standards:

1. Bars for Reinforcement: "Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement", ASTM A-615-82, all bars Grade 60.

2. Fiber Mesh Reinforcement: In addition to all other reinforcing shown or called for in these Specifications or noted on the Drawings, all exterior concrete slabs shall be reinforced as follows:

a. 100% virgin polypropylene fibrillated commercial fibers specifically manufactured for use as concrete reinforcement and so certified by the Manufacturer and containing no reprocessed olefin materials. Add to concrete materials at the time concrete is batched, at the rate of 1.5 lbs. per cubic yard.

(1) Material Characteristics:
(a) Specific Gravity = 0.91
(b) Mod. of Elast. = 0.5 x 10 - 0.7 x 10
(c) Tensile Strength = 70 to 110 ksi
(d) Fiber Lengths = 1-1/2 inch as per the Manufacturer.

2.4 CURING

A. All exterior concrete flatwork shall be treated with a clear resin compound containing a red fugitive dye.

1. The curing compound shall meet the following specifications: ASTM C-309, type ld, unless otherwise approved by the Engineer.

2. As soon as the water sheen is off of the concrete surface, spray the curing compound on at a minimum rate of 200 square feet per gallon.

3. Follow the Manufacturer's preparation and application instructions.

2.5 OTHER MATERIALS

A. Expansion Joint Filler Materials: Flexible, self leveling, polyurethane sealant equal to Sikafelx 1C SL complete with suitable backer rod.

1. Sealant shall conform to Federal Specification TT-S-00230C, Type I, Class A, and ASTM C-290, Type S, Grade P, Class 25.

2. Sealant Manufacturer shall provide a written warranty against defects of the sealant materials for of period of five (5) years from the date of Substantial Completion.

3. Install joint sealant in accordance with the manufacturer's written installation instructions.

B. Air Entrainment: Air entrainment shall conform to ASTM C-260.

C. Accessories: Spacers, chairs and all other material not specifically described but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Engineer.

D. Grout: All grout shall be non-shrink, non-metallic, prepackaged type per Clifford Hill, EMBECO or per Corps of Engineers CRD-C-588.

E. Anchors: All anchors and anchor bolts shall be in accordance with A307 Grade A. Nuts shall conform with A563 Grade A - Heavy hex type.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this Section carefully inspect the installed work of other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that all items to be embedded in concrete are in place.

3. Verify that concrete may be placed to the lines and elevations indicated on the Drawings, with all required clearances from reinforcement.

4. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations, the approved Shop Drawings and the original design.

B. Discrepancies:

1. In the event of discrepancies, immediately notify the Engineer.

2. Do not proceed with the installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FORM WORK

A. General: Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar and able to withstand excessive deflection when filled with wet concrete. Form work shall comply with ACI-347.

B. Layout:

1. Form for all required cast-in-place concrete to be shapes, sizes, lines and dimensions

indicated on the Drawings.

2. Exercise particular care in the layout of forms to avoid necessity for cutting of concrete after it is in place.

3. Exposed external corners shall be bevelled or chamfered by placing molding in the forms, unless Drawings state that chamfering is to be omitted.

4. Perform all forming required for work of other trades and do all cutting and repairing of forms required to permit such installation.

5. Carefully examine the Drawings and Specifications and consult with other trades as required relative to provisions for openings, reglets, chases and other items in the forms.

6. See that all sleeves and/or conduits, pipes, etc., are placed prior to pour.

C. Bracing:

1. Properly brace and tie forms together so as to maintain position and shape and to ensure safety to personnel.

2. Construct all bracing, supporting members and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.

3. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying accurate spreading. Ties that occur in exposed concrete shall have plugs and be of the type which breaks back 1 inch to leave face hole for grout.

D. Tolerances: Construct all forms straight, true, plumb and square.

E. Wetting: Keep forms sufficiently wetted to prevent joints opening up before concrete is placed.

F. Re-use of Forms:

1. Re-use of forms shall be subject to advance approval of the Engineer.

2. Except as specifically approved by the Engineer in advance, re-use of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.

3. Except as specifically approved in advance by the Engineer, re-use of forms shall in no way impart less structural stability to the forms nor less acceptable appearance to the finished concrete.

4. Use all means necessary to protect workmen, passersby, the installed work and materials of other trades, and the complete safety of the project and adjacent facilities.

5. Cut nails and form ties off flush and leave all surfaces smooth and clean. Exposed concrete shall have ties that when broken leave 1 inch deep hole to be grouted.

6. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing-up and rubbing the resulting pockets to match the surrounding areas.

3.3 REINFORCING

A. General:

1. Fabricate all reinforcement in strict accordance with the approved Shop Drawings.

2. Do not use bars with kinks or bends not shown on the Drawings or on the approved Shop Drawings.

3. Do not bend or straighten steel in a manner that will injure the material.

4. Steel reinforcement, at the time concrete is placed around it, shall be free from rust, scale, loose mill scale, oil, paint and other coatings which will destroy or reduce bond between steel and concrete.

B. Design:

1. Bend all bars cold.

2. Make bends for stirrups and ties around a pin having a diameter not less than two times the minimum thickness of the bar.

3. Make bends for other bars, including hooks around a pin having diameter not less than six times the minimum thickness of the bar for #9 and larger.

C. Placing:

1. Provide all accessories such as spacers, chairs, ties and devices necessary to properly assemble, space and support all reinforcement. Before the start of concrete placement, positively secure and support reinforcement by concrete blocks, metal chairs or spacers, or by metal hangers.

D. Clearance:

1. Preserve clear spaces between bars of not less than one times the normal diameter of round bars.

2. In no case let the clear distance by less than 3/4 inch, or less than 1-1/3 times the maximum size of the aggregate.

3. Provide minimum 3" concrete covering of reinforcement unless detailed differently.

E. Splicing:

1. Place bars in horizontal members with minimum laps of 36 bar diameters at splices with 1'-6" minimum length dimension. Tension splices shall be Class C, splice length where noted on the Drawings.

2. Bars may be wired together at laps but not separate more than 1/5 lap or 6".

3. Stagger the splices of adjacent bars.

4. Other Splices: Make only those splices that are indicated on the approved Shop Drawings or specifically approved by the Engineer.

5. Splices shall not be made at or near points of maximum stress.

F. Dowels: Place all required steel dowels with paper sleeves and securely anchor them into position before the concrete is placed.

G. Obstructions: In the event of conduits, piping, inserts, sleeves or any other items interfere with the

placing of reinforcement as indicated on the Drawings or as otherwise required, immediately consults with the Engineer and obtain approval of new procedures before placing the concrete.

3.4 CONCRETE

A. General:

1. Remove all wood scrap and debris from the areas in which the concrete will be placed.

2. Thoroughly clean the areas to ensure proper placement and bonding of concrete.

3. Thoroughly wet the forms (except in freezing weather) or oil; remove all standing water.

4. Thoroughly clean all transporting and handling equipment.

5. Notify the Engineer at least 24 hours before placing concrete.

B. Method of Placing Concrete:

1. Convey concrete from the mixer to place of final deposit by methods that will prevent separation of material.

2. For chuting, pumping and pneumatically conveying concrete use only equipment of such size and design as to ensure a practical, continuous flow of concrete at the delivery end without loss or separation of material.

3. Deposit concrete as nearly as possible in its final position to avoid segregation due to rehandling and flowing. Do not drop concrete freely where reinforcements will cause separation. Do not drop concrete freely more than six feet.

4. Place concrete at such a rate that the concrete is at all times plastic and flows readily between the bars.

5. Place concrete as dry as possible consistent with good workmanship, never exceeding the maximum slump.

6. When placing is once started, carry on as continuous operations until placement of the panel or section is complete.

7. Do not pour a greater area at one time than can be properly finished without checking. This is particularly important during hot or dry weather.

8. Compaction:

a. Thoroughly consolidate all concrete by suitable means during placement, working it around all embedded fixtures and into corners of the forms.

b. During placement, thoroughly compact the concrete by tamping and by mechanical vibration. Do not allow vibrator to touch rebars which extend into concrete which has taken set.

9. Acceptability: Do not use retempered concrete or concrete that has been contaminated by foreign materials.

10. Place all concrete within one (1) hour after water has been added to the mix.

C. Joints:

1. Location: Make and locate construction joints as shown on the Drawings. Reinforcement to be continuous through the joint.

2. Approval: Obtain the Engineer's approval of location of all construction joints and control joints in the work prior to start of concrete placement. Reinforcement shall be continuous through construction joints.

3. No reinforcement, corner protection angles or other fixed metal items shall be run continuous through joints containing expansion filler, through crack control joints in slab-on-grade and vertical surfaces. Reinforcement shall be interrupted, 2" clear on each side, at crack control joints. Exception: Where dowels are specifically shown on the Drawings.

4. Finishing Flatwork:

a. When bleed water has disappeared and concrete will sustain foot pressure with only about 1/4" depression, proceed with the finishing.

b. All slabwork shall have a light broom finish; Engineer shall be consulted for direction of the brooming.

D. Curing:

1. See 2.04 of these Specifications.

E. Weather Requirements:

1. Placement:

a. Do not use concrete with a placing temperature that will cause difficulty from loss of slump, flash set or cold joints.

b. Maintain a concrete temperature during placement of less than 80 degrees F.

c. Use all means necessary to avoid drying of concrete prior to finishing operations.

2. Protection: Provide and use all required windbreaks, sunshades, fog spays and other devices to protect the concrete.

3. Cold Weather: Comply with ACI Standard 306R-78 and as approved by the Engineer.

4. Hot Weather: Comply with ACI Standard 305R-77 (latest revision) and as approved by the Engineer.

F. Defective Work:

1. Minor Defective Areas:

a. Chip away to a depth of about 1 inch, leaving edges perpendicular to the surfaces: wet the areas to be patched and a space of at least 6 inches wide around it to prevent water being absorbed out of the mortar.

b. Coat the area to be patched with a cement wash consisting of neat cement and a solution of one part "Konset", or equal approved by the Engineer, to four parts of water; apply the patching mortar immediately.

c. Patching mortar shall consist of one part cement to three parts water, to a consistency as dry as possible within the requirements of handling and placing; thoroughly compact the mortar by ramming it into place.

d. Screed off so as to leave the patch slightly higher than the surrounding surfaces; leave undisturbed for a period of one to two hours to permit initial shrinkage; and the perform final finishing.

e. Finish the patch to match adjacent surfaces and keep wet for at least seven days; provide and install all required protective coatings.

2. Major Defective Areas: (when allowed by the Engineer): If the defects are serious or affect the strength of the structure, or if patching does not satisfactorily restore the quality and appearance of the surface, the Engineer may require the concrete to be removed and replaced, complete, in accordance with the provisions of this Section, all at no additional cost to the Owner.

G. Sacking: (Rubbed Finish for Exposed Concrete) After removing forms and while concrete is still green, all exposed vertical surfaces of the concrete shall have burrs knocked off with stone; shall patch form tie holes and apply a "sacking" finish by coating the concrete with a mixture of one part fine sand to one part cement and enough water to provide a creamy consistency, using burlap sacking for application, and achieving a uniformly textured surface with color to match adjacent concrete. Remove all form marks and other defects.

H. Cleaning: Clean all exposed concrete and all adjoining work stained by leakage or splashing of concrete.

I. Sealing Treatment: All exterior flatwork shall be sealed with two applications of sprayed-on sealing treatment which is compatible with the previously applied curing compound. Sealing shall not be done in freezing weather and not before concrete is 28 days old. Concrete shall be clean and dry. All work shall be in strict accordance with the Manufacturer's latest technical data guide. Proposed products to be used must be approved by the Engineer prior to application.

* END OF SECTION 03300 *

SECTION 16000 - GENERAL PROVISIONS, ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and Division 1 Specification Sections apply to work of this section and all other Division 16 specification sections.

B. This section applies to all Division 16 specification sections.

1.2 SUMMARY

A. This section includes general administrative and procedural requirements for electrical installations to expand the requirements of the General Conditions and Division 1 Specification Sections.

1.3 STANDARDS

A. The following industry standards are considered minimum requirements for electrical work and are made a part of the contract documents:

1. National Electrical Code, 2005 Edition (NEC)
2. Electrical Ordinances of Local Governing Authority
3. Utah State Fire Marshal's Rules and Regulations
4. International Building Code, 2006 Edition
5. International Fire Code, 2006 Edition
6. Underwriters Laboratories (UL) Standards
7. American National Standards Institute (ANSI)
8. National Electrical Manufacturer's Association (NEMA)
9. National Fire Protection Association (NFPA) Standards
10. Regulations of American Standards Association

B. If any conflict occurs between these rules and the contract documents or between the plans and specifications, notify the Engineer promptly in writing. Do not proceed with any work in conflict until a solution is approved in writing by the Engineer.

1.4 WORKMANSHIP

A. All Electrical Work of any nature shall be performed by qualified electricians, experienced in the type of work to be performed and licensed with the State of Utah. Electricians shall show their license upon request of the Owner, Engineer and/or their representatives.

1.5 ELECTRICAL WORK INCLUDED

A. The basic contract work includes all labor, material, tools, transportation, equipment, and superintendence specified, indicated on the drawings or necessary to make a complete installation of, but not limited to, the following:

1. Appliances, apparatus and materials not specifically noted on drawings or mentioned herein, but which are necessary to make a complete working installation of all electrical systems required for the project.

2. Hangers, anchors, sleeves, chases, supports and fittings as may be required and as indicated.

3. Branch circuits for power and lighting with raceway system and outlet boxes.

4. Replacement of existing building lighting control systems complete with all equipment in operative condition.

5. New exterior lighting fixtures, poles, concrete bases, and controls.

1.6 SUBSTITUTIONS

A. Material or products specified by name of manufacturer, brand or trade name or catalogue reference will be the basis of the bid and furnished under the contract unless changed in writing by the Engineer. Where two or more materials are named, the choice of these will be optional with the Contractor.

B. Submit requests for substitution in writing to the Engineer in accordance with the Project Schedule.

1.7 ACCURACY OF DATA

A. Data given herein and on the drawings are as exact as could be secured, but their absolute accuracy is not guaranteed. Specifications and drawings are for the assistance and guidance of the Contractor.

B. Electrical drawings are diagrammatic, but will be followed as closely as building construction and work of other contractors will permit. All deviations from the drawings required to make the Electrical Work conform to the building as constructed and to the work of other contractors will be made by the Contractor as approved by the Engineer.

1.8 VISIT THE SITE

A. Contractors are assumed to have visited the site and thoroughly acquainted themselves with conditions affecting the proposed work. Verify existing conditions and measurements at the building before beginning work and immediately notify the Engineer of any discrepancies which may adversely affect completion of the work.

1.9 TEMPORARY POWER

A. Provide temporary power for reasonable convenience during construction in accordance with the General Conditions.

B. Provide GFCI Protection for all temporary power outlets.

C. Use temporary power for construction purposes only. Do not use temporary power for electric space heating, etc..

1.10 SHOP DRAWING SUBMITTALS

A. As soon as possible after contract award, submit shop drawings for review in accordance with the General Conditions and Division 1 Specifications.

B. Submit shop drawings in three ring loose-leaf binder.

C. Divide Electrical equipment into subsections of common equipment such as wiring devices, lighting fixtures, panelboards, starters, etc.. Provide a complete equipment list at the beginning of each subsection.

D. Provide manufacturers' catalogue and/or descriptive literature indicating specific model and/or catalog numbers, options, accessories and modifications for the following items:

1. Wiring Devices
2. Light Fixtures and Poles
3. Lighting Control System

E. Above list is considered minimum. Additional items may be required to be submitted for review.

F. Refer to individual Specification Sections for additional Shop Drawing Submittal requirements.

1.11 RECORD DRAWINGS

A. Provide As-Built Record Drawings in accordance with the General Conditions and Division 1 Specifications.

B. Indicate location and routing of all underground raceways on the As-Built Record Drawings by dimension to permanent structures such as buildings, sidewalks, curbs, etc.

C. Indicate all changes made to the drawings such as changes in fixture and outlet location, changes in circuit routing and circuit numbering, etc. Include all changes by Addenda, Change Order, Supplemental Instruction or verbal instruction.

D. Refer to individual Specification Sections for additional Record Drawing requirements.

1.12 OPERATION AND MAINTENANCE MANUALS

A. Provide Operation and Maintenance Manuals in accordance with the General Conditions and Division 1 Specifications.

B. Include manufacturers' catalog and/or descriptive literature of equipment actually installed. Clearly indicate on literature the specific model and/or catalog numbers of equipment installed, including all options, accessories and/or modifications.

C. All copies of literature will be new, clean and clearly legible. Sheets used for shop drawing submittals with review stamp, remarks, etc., will not be acceptable.

D. Divide Electrical equipment into subsections of common equipment such as wiring devices, lighting fixtures, panelboards, starters, etc.. Provide a complete equipment list and recommended maintenance schedule at the beginning of each subsection.

E. Refer to individual Specification Sections for additional Operation and Maintenance Manual requirements.

F. Include copies of all code inspection reports, equipment test reports, concrete delivery tickets, and similar items.

1.13 WARRANTY

A. Provide Warranty for Electrical Work in accordance with the General Conditions and Division 1 Specifications.

B. Provide manufacturer's warranty for all equipment which the manufacturer normally provides a warranty in excess of twelve months. Refer to individual Specification Sections for extended warranty requirements.

1.14 EXTRA MATERIAL STOCK

A. Provide extra stock in original cartons, or packaged with protective coverings, for storage and identified with labels clearly describing contents.

B. Turn over extra stock to Owner and place in storage prior to Substantial Completion. Exact location of storage to be determined by the Owner.

C. Obtain signed receipt for extra stock materials from the Owner's Project Manager. Include copy of signed receipt in the Project Operation and Maintenance Manuals.

D. Provide the following extra stock of materials to the Owner.

1. Lamps and fixture fuses: refer to Specification Section 16500 - Lighting for required quantities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials and equipment for which U.L. Standards have been established, will be listed by and bear the label of Underwriters Laboratories, Inc..

B. All materials will be new and bear the manufacturer's name, trade name and catalog or model numbers. Similar items will be of the same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of materials will comply with all codes and be accomplished with good workmanship in the judgement of the Engineer.

3.2 COOPERATION WITH OTHER CONTRACTORS

A. Cooperate with other contractors doing work on the building as may be necessary for the proper execution of the work of various trades employed in construction of the building.

B. Refer to drawings, for construction details, and coordinate the electrical work with that of other contractors to the end that unnecessary delays and conflicts will be avoided.

3.3 MATERIAL HANDLING

A. Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

3.4 CUTTING AND REPAIRING

A. Provide all required digging, cutting, etc. incidental to the Electrical Work. Make required repairs thereafter to the satisfaction of the Engineer.

B. Do not cut into any major structural element, beam or column, without written approval of the Engineer.

C. Install the Electrical Work to proceed with other trades in order to avoid unnecessary cutting of the construction.

3.5 CONSTRUCTION REVIEW

A. The Owner and/or Engineer will perform construction review throughout the construction of the

project. The construction review does not relieve the contractor from the responsibility of providing all materials and performing the work in accordance with the Contract Documents.

B. Notify the Engineer in writing, giving ample notice, at the following stages of construction and allow the Owner, Engineer and/or Engineer to review the installed work.

1. When underground electrical work is complete, before backfilling, including work under floor slabs.
2. When all electrical rough-in is complete, but not covered.
3. Pre-Final, upon completion of all electrical work.
4. Final, upon completion of all items noted in the Pre-Final Construction Review Report.

C. Prerequisite for Final Electrical Construction Review:

1. Electrical Engineer/Consultant must be present.
2. Electrical Contractor's job foreman must be present.
3. DFCM Representative must be present.
4. Clear access must be provided to all devices and equipment.
5. All panels, disconnects, etc. must be labeled and typed panel index cards installed.
6. All light fixtures, outlets, equipment, etc., must be energized and operable.
7. Contractor must have pad and pencil to list all deficient items.
8. Make all corrections and adjustments after the Final Construction Review, not during. Items requiring correction will appear on the Final Construction Field Report.
9. Contractor must have all required keys to provide access to all panels and doors.

D. Test all systems and equipment provided and/or connected under the Contract for short circuits, ground faults, proper neutral connections and proper operation in the presence of the Owner and/or Engineer.

E. The entire construction will be installed in accordance with the contract documents and be free of mechanical and electrical defects prior to final acceptance of the work.

3.6 CODE INSPECTIONS

A. The Owner will engage the services of third party agency to conduct code compliance inspections.

B. The Contractor will be responsible to coordinate and schedule inspections with the inspection agency. Schedule code inspections to coincide with project meetings when possible so that duplication of code inspection and engineer’s job site observations will be minimized.

C. Notify the Engineer and Owner not less than 24 hours before each scheduled inspection.

* END OF SECTION 16000 *

SECTION 16060 - MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Remove electrical equipment and wiring systems and make required extensions and reconnections as shown on Drawings and specified herein.

B. Repair all damage resulting from demolition and extension work.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Provide new materials and equipment for patching and extending work as specified in the appropriate Specification Section for the materials and equipment involved.

B. Where materials or methods not included in the Specifications are required, provide materials and methods in accordance with normal construction industry standards and as approved by the Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Field verify existing measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on field observation of existing surface conditions and available existing building electrical drawings. Report discrepancies to the Engineer before disturbing existing installation.

D. All demolition and extension work is not necessarily indicated on Drawings. Include all such work without additional cost to Owner.

3.2 PREPARATION

A. Coordinate utility service outages with SLCC Facilities Project Manager.

B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use electricians experienced in such operations.

C. Protect all existing electrical equipment to remain from damage during demolition and new construction. Survey all existing equipment prior to beginning work and document in writing any existing damage to existing equipment.

3.3 DEMOLITION

A. Coordinate with Owner for equipment and materials to be removed by Owner or salvaged by the

contractor for Owner. Place salvaged equipment and materials in storage at the project site as directed by the Owner.

B. Legally dispose of all removed equipment and materials not salvaged for the Owner.

C. Remove abandoned wiring to source of supply, i.e. panelboard, circuit breaker, etc..

D. Remove accessible abandoned conduit, cables, junction boxes, etc., including above accessible ceilings. Cut conduit flush with walls and floors.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlet boxes and conduit servicing them where indicated on drawings. Provide blank cover for abandoned outlets which are not indicated to be removed.

3.4 EXTENSION OF EXISTING ELECTRICAL WORK

A. Reconnect existing equipment where demolition interrupts existing branch circuits or feeders to the equipment.

B. Repair adjacent construction and finishes damaged during demolition and extension work to match surrounding surfaces.

C. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

D. Extend existing installations using materials and methods as specified for new work. Remove and replace existing installations which are not compatible with new work.

3.5 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.6 INSTALLATION

A. Install relocated materials and equipment as required for new materials and equipment.

3.7 OUTAGES

A. Maintain Existing Electrical Systems in service until new systems are complete and ready for service. Disable systems only to make switchovers and connections. Minimize outage duration.

B. Obtain permission SLCC Facilities Project Manager before partially or completely disabling systems in accordance with Division 1 Specification Sections.

* END OF SECTION 16060 *

SECTION 16110 - RACEWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide a complete raceway system for all wiring as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.1 RACEWAYS

A. Provide minimum 3/4" trade diameter raceways for all wiring systems.

1. Minimum 1/2" trade diameter raceways may be used for remote control, signaling and power-limited circuits which meet the requirements of National Electrical Code Article 725 as allowed in other Specification Sections and/or as approved by the Engineer.

B. Do not use aluminum conduit, intermediate steel conduit (IMC), BX cable, MC cable, Flexible Non-metallic Tubing, NM cable, Direct Burial Cable or any other wiring methods not allowed by this specification unless approved in writing by the Engineer and/or Engineer.

2.2 ABOVEGROUND RACEWAYS

A. Provide Electrical Metallic Tubing (EMT), galvanized inside and out, for raceways not subject to permanent moisture or damage.

B. Provide Galvanized Rigid Steel Conduit (GRC) where raceways are subject to permanent moisture such as underground, or damage such as vehicular traffic, etc..

2.3 UNDERGROUND RACEWAYS

A. Provide Schedule 40 PVC electrical conduit in earth or in concrete in contact with earth.

1. Provide a separate ground wire in all PVC conduits, except main electrical service conduits.

2. Provide Galvanized Rigid Steel Conduit (GRC) for all bends greater than 22 degrees in PVC conduits.

3. Do not use PVC conduit above grade nor for penetrations through structural elements such as foundation walls, floor slabs, etc..

B. Provide Galvanized Rigid Steel Conduit (GRC) for conduit penetrations through floor slab or grade to extend minimum 12" above floor or grade.

C. Provide Galvanized Rigid Steel Conduit (GRC) for conduit penetrations through foundation walls to extend minimum 36" beyond the foundation wall.

D. Corrosion protect all galvanized rigid steel conduit (GRC) installed in earth or in concrete in contact with earth with two (2) half-lapped layers of 0.010" thick approved waterproof PVC tape equal to Scotch No. 50 or use factory PVC coated rigid steel conduit with all field joints coated

after installation.

2.4 FLEXIBLE RACEWAY CONNECTIONS

A. Provide Flexible Steel Conduit for final connection to equipment subject to vibrations or movement, not to exceed 3 feet in length.

B. Provide liquid-tight flexible steel conduit outside and in wet, humid, corrosive and oily locations.

1. Provide Sunlight Resistant liquid-tight flexible steel conduit outdoors.

C. Provide a ground conductor in all flexible steel conduit.

D. Flexible Steel Conduit may be used where misalignment or cramped quarters exist only with prior approval of the Engineer.

E. Flexible Steel Conduit may be used to fish through existing walls and ceilings only with prior approval of the Engineer.

2.5 CONDUIT FITTINGS

A. Provide steel compression type or steel set screw type fittings for Electrical Metallic Tubing.

B. Provide malleable iron clamp type fittings for Flexible Steel Conduit.

C. Provide steel compression type fittings for Liquid-Tight Flexible Steel Conduit.

D. Provide threaded fittings for GRC conduit. Provide double locknuts and plastic bushing for GRC conduit terminations or provide boxes and enclosures with threaded hubs.

E. Provide liquid-tight and gas-tight conduit fittings underground using fittings and PVC cement as recommended by the conduit manufacturer.

F. Provide steel rain-tight, compression type fittings for all conduit installed outside and in wet, humid, corrosive and oily locations.

G. Provide Insulated Throat Connectors for all conduit terminations 1" diameter and smaller. Provide insulating bushings for all conduit terminations 1-1/4" diameter and larger.

H. Provide Grounding Bushings bonded to the electrical system ground:

1. On each end of all feeder conduits in which a separate ground conductor is installed.

2. On each end of all conduits used to protect ground conductors.

3. On all conduit terminations installed in concentric or eccentric knockouts or where reducing washers have been installed.

I. Do not use cast metal or indenter type fittings. Do not use screw-in type fittings for Flexible Steel Conduit. Do not use spray (aerosol) PVC cement.

2.6 RACEWAY SEALS

A. Seal all conduit penetrations through fire rated walls, ceilings and floors with a UL classified fire barrier system as manufactured by Scotch 3M or Nelson Electric which will provide an immediate fire seal, require no curing time, and emit no hazardous or toxic fumes.

B. Seal all conduit penetrations through airtight spaces and plenums with an approved mastic

compound acceptable to the Engineer to prevent air leakage.

C. Seal underground conduit penetrations into interior basements, tunnels, etc., watertight with OZ Gedney type CSML, or Link Seal type 'C' conduit sealing fittings.

2.7 PULL BOXES

A. Provide pull boxes or conduit bodies in accessible locations where required to reduce the number of bends in the conduit run to less than 360 degrees and at points not exceeding 100 feet in long branch circuit conduit runs.

1. Indicate exact location of pull boxes and conduit bodies on the As-Built Record Drawings.

2.8 PULL STRING

A. Provide a nylon or polypropylene pull string with not less than 200 lb tensile strength in all spare conduits and conduits installed for use by others. Provide a hard cardboard tag for each raceway to indicate location of the opposite end of the raceway.

PART 3 - EXECUTION

3.1 SUPPORTS

A. Securely support all raceways with full (2 hole) pipe straps, hangers, or ceiling trapeze directly from building structure such as roof trusses, beams, floor joists, etc., in accordance with Specification Section 16190 - Supporting Devices.

1. Do not support raceways from other electrical systems or mechanical systems.

B. Provide supports at 5'-0" on center with a minimum of two supports for each ten foot length of conduit or fraction thereof up to 6 feet.

C. Provide a support within 12" of each coupling, fitting, box, enclosure and bend.

1. Install supports at vertical to horizontal conduit bends on the upper side of the bend.

D. Provide support method for parallel conduit runs as follows:

No. of Conduits	3/4" to 1-1/4" Conduits	1-1/2" and larger Conduit
2	Full Strap, Clamp or Hanger	Mounting Channel
3 or More	Mounting Channel (Trapeze)	Mounting Channel

3.2 INSTALLATION

A. Raceway layouts on the drawings are generally diagrammatic and the exact routing of raceways will be governed by structural conditions and the work of other contractors.

B. Install raceways concealed within finished ceilings, walls and floors except where exposed raceways are specifically shown on the drawings or permitted by the Engineer.

C. Install exposed raceways parallel with or perpendicular to walls and ceilings, with right angle turns consisting of symmetrical bends or conduit bodies equal to Crouse-Hinds "Condulet". Avoid all bends and offsets where possible.

1. Paint exposed raceways to match surrounding surfaces.

D. Install raceways minimum 12" from insulation of hot water piping, steam piping and other systems

or equipment with temperatures in excess of 104^0 F (40^0 C).

E. Make all field bends and offsets with a radius not less than allowed by the National Electrical Code for the type of raceway system.

1. Do not install bends or offsets which are flattened, kinked, rippled or which destroy the smooth internal bore or surface of the conduit.

F. Cap the open ends of raceways during construction to prevent the accumulation of water, dirt or concrete in the raceways. Thoroughly clean raceways in which water or other foreign matter has been permitted to accumulate or replace the raceway where such accumulation cannot be removed by a method approved by the Engineer.

G. Do not install raceways which have been crushed or deformed in any manner.

H. Do not install wiring until work which might cause damage to the wires or raceways has been completed.

3.3 UNDERGROUND RACEWAY INSTALLATION

A. Install underground raceways outside of building minimum 24" below finished grade to the top of the raceway.

1. Provide a plastic red magnetic warning ribbon stating "CAUTION - BURIED ELECTRICAL" 12" directly above the top of the raceway.

B. Use select granular fill, free of rocks or hard clumps with sharp or angular edges, for the first 6" of backfill around underground raceways including raceways below concrete floor slabs. Provide imported sand backfill where required by Division 2 Specifications or where excavated materials are not suitable.

C. Coordinate location of underground raceways to avoid areas where raceways may be damaged by subsequent installation of trees, shrubbery or other landscape vegetation.

D. Install underground raceways minimum 3'-0" from parallel runs, and minimum 1'-0" from perpendicular runs, of underground natural gas and propane lines.

E. Do not use torches to heat PVC conduit for field bends. Do not install PVC conduit that has been scorched by heating for bends.

* END OF SECTION 16110 *

SECTION 16120 - CONDUCTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide all conductors for power and lighting as shown on drawings and as specified herein.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Provide Copper building wire, minimum #12 AWG, with type THHN/THWN or XHHW 600 volt insulation, except as otherwise noted on the drawings or required by NEC.

1. Provide conductors in underground raceways with insulation approved for wet locations such as type THWN or XHHW.

B. Provide stranded conductors for wires #8 AWG and larger and for terminal connections to all motors. Stranded or solid conductors may be used for sizes smaller than #8 AWG at the contractor's option.

C. Provide conductors rated 90^0 C minimum in wiring channels of Fluorescent and High Intensity Discharge lighting fixtures.

D. Provide conductors with surface printed identification showing conductor size and material, insulation type, voltage rating and approvals at regularly spaced intervals of 24".

E. Do not use sizes smaller than #12 AWG in branch circuits carrying load. Circuits requiring larger sizes to meet voltage drop conditions, etc., are indicated on the drawings.

1. Where branch circuit homeruns indicate conductor size, use that size conductor for the entire branch circuit, including switch legs, etc.

F. Do not use aluminum conductors.

2.2 SPLICES

A. Provide Ideal wirenuts or Scotchlock spring connectors for all conductor splices #8 AWG and smaller. Provide split-bolt or compression type connectors for all conductor splices larger than #8 AWG.

B. Provide splices which are UL listed for the type, quantity and size of the conductors to be spliced.

C. Provide all splices with insulation at least equal to that of the conductor.

D. Provide watertight splices in junction or outlet boxes located outside and in wet locations by means of heat shrink insulating kits.

E. Splice conductors only in approved boxes.

F. Do not splice conductors in conduit bodies, panelboard enclosures, switchboard enclosures or

similar locations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all conductors in approved raceway systems.

B. Install branch circuit conductors continuous without splice between fixture outlet boxes, terminals of devices and panelboards.

1. Provide suitable junction boxes in readily accessible locations where splices are necessary at intermediate points of branch circuits. Indicate exact location of all boxes on the As-Built Record Drawings.

C. Do not install wiring until work which might cause damage to the wires has been completed.

3.2 COLOR CODING AND IDENTIFICATION

A. Color code all wiring at each enclosure and box where conductors are accessible and at each splice, tap or termination by means of colored conductor insulation.

1. For conductors #6 AWG and larger, colored self-adhesive tape with the appropriate color designations may be used.

B. Color code each conductor of each circuit as follows.

1. Ground: Green or Bare Copper

2. 120/208 Volt, 3 Phase, 4 Wire System
   a. Phase A - Black
   b. Phase B - Red
   c. Phase C - Blue
   d. Neutral - White

3. 277/480 Volt, 3 Phase, 4 Wire System
   a. Phase A - Brown
   b. Phase B - Yellow
   c. Phase C - Violet
   d. Neutral - Gray

4. Match existing conductor color coding if different than above.

C. Color code switch legs and travelers according to phase with colors other than used for phase conductors, to be consistent throughout the project.

3.3 IDENTIFICATION

A. Provide conductor identification in accordance with Specification Section 16195 - Electrical Identification.

3.4 MULTI-WIRE BRANCH CIRCUITS

A. Where a common neutral is run for multi-wire branch circuits, connect phase conductors to separate phases such that the neutral conductor will carry only the unbalanced current. Use neutral conductors of the same size as the phase conductors unless specifically noted otherwise.

B. Do not install more than three phase conductors in any raceway except where specifically shown

on the drawings or approved by the Engineer.

3.5 PHASE ROTATION

A. Phase rotation for Three Phase System will be A leads B Leads C from front to back, from left to right or from top to bottom as viewed from the front of the enclosure.

* END OF SECTION 16120 *

SECTION 16130 - ELECTRICAL BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide junction boxes and outlet boxes at each outlet, fixture and other device location as shown on drawings and as specified herein.

PART 2 - PRODUCTS

2.1 OUTLET AND DEVICE BOXES

A. Provide galvanized or cadmium plated sheet steel electrical boxes in indoor dry locations, of the most suitable size and shape for the conditions encountered and in accordance with NEC requirements for the number of conductors allowed.

B. Provide minimum 4" Square or Octagonal, 1-1/2" Deep Boxes unless specifically indicated otherwise on the drawings.

1. Provide minimum 4" Square or Octagonal, 2-1/8" Deep Boxes where Three (3) conduit connections are required.

2. Provide minimum 4-11/16" Square, 2-1/8" Deep Boxes where Four (4) or more conduit connections are required.

3. Provide gang boxes where more than one device is located at the same point.

4. Boxes smaller than 4" Square or Octagonal, even though of equivalent cubic inch capacity, are not acceptable.

C. Provide Type FD cast metal boxes outside, in wet, humid or corrosive locations and where exposed to damage such as vehicular traffic.

D. Confer with the various equipment suppliers and either use or properly provide for boxes which are furnished with the equipment, such as speakers, horns, bells, etc..

E. Do not use "THRU-THE-WALL" boxes, sectional (gangable) boxes or non-metallic boxes.

2.2 JUNCTION BOXES

A. Provide junction boxes as specified for outlet and device boxes except that boxes 6" square and larger may be painted sheet steel.

2.3 BOX ACCESSORIES

A. Provide fittings, plaster rings, cover plates and other accessories suitable for the purpose and location of each box.

B. Provide industrial raised covers for surface mounted outlet and device boxes.

PART 3 - EXECUTION

3.1 SUPPORTS

A. Support each box from the building structure independent of the raceway system.

B. Support flush mounted wall boxes with metal bar hangers or metal stud backing behind the box secured to wall studs.

C. Support flush mounted ceiling boxes with metal bar hangers secured to ceiling support system or threaded rod hangers secured to structure.

D. Secure surface mounted boxes to building structure with minimum of 2 screws or bolts as required.

E. Do not use side mounted boxes or brackets.

3.2 INSTALLATION

A. Install flush mounted boxes, after being equipped with extensions, accessories, etc., flush with finished face of wall, ceiling or floor.

1. Replace or repair all boxes not installed flush with finished surfaces to the satisfaction of the Engineer.

B. Seal around the surface of all switch and outlet boxes with plaster or grout to close any opening between the outlet box and the wall finish.

C. Install boxes level and plumb.

3.3 LOCATIONS

A. The wiring system layouts on the drawings are generally diagrammatic and the location of outlets and equipment are approximate.

B. Study all available drawing details, shop drawings, equipment drawings, building conditions and materials surrounding each outlet and device box prior to installing the box to ascertain the exact location required for each box.

C. Rough in the electrical work such that electrical outlets, fixtures and other fittings are properly fitted to the work of other trades.

D. Do not install boxes inside cupboards, behind drawers, or otherwise so located, as to be inaccessible or unsuited for the purpose intended.

E. The right is reserved to make any reasonable change in the location of the outlets before roughing in, without involving additional expense.

3.4 MOUNTING HEIGHT

A. Install outlet and device boxes at the heights shown on the drawings or as directed by the Engineer. In general, mount outlets as follows.

1.	Convenience Outlet	18"
2.	Wall Switch	46"

B. All mounting heights, including mounting heights indicated on drawings, are to the center of the outlet box above finished floor or grade unless noted otherwise.

C. Refer to applicable Specification Sections for mounting heights of devices and equipment not included above or install at heights as directed by the Engineer and/or Engineer.

* END OF SECTION 16130 *

SECTION 16140 - OUTLETS AND WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide all wiring devices complete with coverplates and necessary accessories as shown on the drawings and as specified herein.

1.3 SUBMITTALS

A. Provide submittals for each type of wiring device to be used on the project in accordance with Division 1 Specifications and Section 16000 - General Provisions, Electrical to verify compliance with the contract documents.

PART 2 - PRODUCTS

2.1 WIRING DEVICES

A. Provide wiring devices rated 20 amps minimum, as specified below, or equivalent of Eagle, General Electric, Hubbell, Leviton or Pass & Seymour.

1.	Switch, Single Pole	Bryant 4901
2.	Receptacle, duplex convenience, 3-wire	Bryant 5352
3.	Receptacle, duplex, GFCI protected	Bryant GFR53FT

B. Color of devices in finished areas will be as selected by the Engineer from the manufacturer's standard colors to compliment the color of architectural finishes.

C. Provide Gray devices in unfinished spaces such as mechanical and electrical rooms.

D. Provide convenience outlets with GFCI protection in accordance with NEC requirements, where installed outside or within 6 feet of any sink and as indicated on the drawings.

1. Provide a self-adhesive printed label stating "GFCI PROTECTED" for each outlet protected by feed-through GFCI receptacles or GFCI circuit breakers.

2. Use feed-through GFCI outlets only to protect other outlets within sight of the GFCI protected outlet.

2.2 COVERPLATES

A. Provide a cover plate for each outlet and box suitable for the location and function of the outlet and box.

B. Provide blank cover plates for junction boxes and outlet boxes not used.

C. Provide nylon or impact resistant thermoplastic coverplates for outlets and boxes installed in finished areas, of the same manufacturer and color as the wiring devices.

D. Provide Stainless Steel coverplates for outlets and boxes installed in unfinished areas such as mechanical and electrical rooms.

E. Provide UV Stabilized Polycarbonate, "Raintight While In Use" coverplates with spring return lids and suitable gasket as manufactured by Eagle or Taymac for all devices installed outside or in wet locations.

2.3 ACCESSORIES

A. Equip each outlet with devices suitable for the purpose of the outlet and with means of properly connecting the equipment served, whether or not such devices are specifically mentioned.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Properly locate each outlet to fulfill its particular purpose. Do not install receptacles or boxes inside cupboards, behind drawers, or otherwise so located, as to be inaccessible or unsuited for the purpose intended.

B. Install all outlets and wiring devices flush with face of coverplate, with the coverplate in contact with the finished face of the wall and with mounting strap of device in contact with the outlet box.

* END OF SECTION 16140 *

SECTION 16190 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide suitable supporting devices for all electrical equipment, raceways and components as specified herein and as shown on the drawings.

B. Refer to individual specification sections for additional supporting requirements.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

A. Provide support anchors which will support in tension a minimum of 4 times the weight of the equipment to be supported but not less 100 lbs.

B. Provide wood screws in wood; toggle bolts in hollow masonry units; expansion bolts with lead shield or shot anchors in concrete and brick; and machine screws, threaded 'C' clamps or spring-tension clamps on steel work.

C. Do not use tie wire for support unless specifically called for in individual specification sections.

D. Do not use threaded C Clamps on tapered steel sections.

E. Do not weld supports, equipment, boxes, raceways, etc., to steel structures.

F. Do not use wooden plugs or plastic inserts as a base for supports.

G. Do not use shot anchors or drilled anchors of any kind in prestressed or post-tensioned concrete slabs and beams except as approved in writing by the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Secure supporting devices to building structure.

B. Do not install supporting devices with sheetrock or plaster as the sole means of support. Provide proper blocking behind the sheetrock or plaster as required to support equipment.

* END OF SECTION 16190 *

SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide identification of all electrical equipment, devices, enclosures, conductors, cables, etc., as shown on the drawings and as specified herein.

B. Refer to individual specification sections for additional identification requirements.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Provide engraved laminated micarta or plastic nameplates to identify each panelboard, cabinet, motor starter, disconnect, etc., with the following minimum lettering heights:

1. Lighting Control Relay Panels. - 3/8"

B. Provide Black Nameplates with White Lettering unless noted otherwise, or required to contrast with equipment enclosures.

C. Do not use Dynamo Labels, printed labels, etc., unless specifically called for in other specification sections or approved by the Engineer and/or Engineer.

2.2 EQUIPMENT IDENTIFICATION

A. Provide engraved nameplates on the exterior of each Lighting Relay Panel to include the panel Designation.

1. Example: LIGHTING RELAY PANEL ‘RP02'

B. Provide engraved nameplates on the exterior of feeder and other major junction boxes and pull boxes to indicate the function of the wiring within the box such as "PANEL 'A' FEEDER" or "FIRE ALARM PULLBOX".

2.3 CONDUCTOR IDENTIFICATION

A. Identify each branch circuit and each feeder conductor at each outlet box, pull box, or other accessible location with hand lettering in black India ink in the enclosure to indicate panel and circuit numbers of all conductors in the enclosure.

B. Identify individual conductors with self adhesive printed markers equal to Thomas & Betts "E-Z Code" markers in outlet boxes, pull boxes, or other accessible location according to the circuit number in outlet boxes, pull boxes, etc., at the following locations:

1. Where circuit number of individual conductors cannot be determined by color coding, such as two or more conductors on the same phase.

2. Where more than one neutral conductor occurs, or where the neutral conductor is not common to all phase conductors, identify the neutral conductor according the associated

phase conductor(s) circuit number(s).

3. Provide identification of control conductors according to numbering on the control wiring diagrams as indicated on the drawings and/or as indicated on Lighting Relay Panel shop drawings.

2.4 CIRCUIT INDEX

A. Provide a neatly typed index, to include type of load served and the specific location of the load for each branch circuit of each panelboard and each relay of lighting relay panels.

1. Provide a new typed index for each existing panelboard in which branch circuits are added, removed, or modified to reflect all changes in circuiting.

B. Do not use room numbers shown on plans, use room numbers or nomenclature assigned to rooms by the Owner. Do not use remarks from panel schedules on drawing, the remarks are for the Contractor's reference only.

C. Include the control circuit at the top of the circuit index for each lighting relay panel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install nameplates to be visible from normal viewing angles.

B. Attach nameplates to equipment enclosures with stainless steel screws or rivets. Adhesives are not acceptable.

C. Install panel index behind protective plastic covering.

* END OF SECTION 16195 *

SECTION 16400 - SECONDARY SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

PART 2 - PRODUCTS

2.1 SYSTEM

A. The Existing Secondary Electrical Distribution System is 277/480 Volt, Three Phase, Four Wire, 60 Cycle for HID Lighting, Fluorescent Lighting, and Equipment; and 120/208 Volt, Three Phase, Four Wire, 60 Cycle for Incandescent Lighting, Appliances and Outlets.

PART 3 - EXECUTION

3.1 POWER OUTAGES

A. Power outages to any portion of the existing buildings will not be allowed except on weekends, holidays and/or as directed by the Owner.

1. Submit written requests for power outages to the SLCC Facilities Project Manager not less than Seven (7) working days prior to all proposed outages.

2. Do not take any power outages without the Owner’s permission.

* END OF SECTION 16400 *

SECTION 16450 - SECONDARY GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Ground all non-current carrying metallic parts of electrical equipment, raceway systems and the neutral conductor of the wiring system as shown on the drawings and specified herein.

PART 2 - PRODUCTS

2.1 GROUND CONDUCTORS

A. Provide copper ground electrode conductors, minimum No. 8 AWG solid. Stranded conductors may be used for sizes No. 2 AWG and larger.

B. Provide an insulated equipment ground conductor in all raceways on the load side of the service disconnect.

2.2 GROUND CONNECTIONS

A. Make ground connections to the existing building ground system and extend to new electrical equipment, raceways, outlets, lighting, etc..

B. Bond the neutral conductor to electrical service ground system at the main transformer and the main service equipment only.

C. Bond all interior metallic piping systems to the electrical service ground system.

D. Make above ground connections by means of pressure connectors, compression connectors, clamps or other means which are UL Listed and classified as suitable for purpose.

E. Make all underground connections by means of an exothermic welding process equal to Cadweld or Thermoweld, in strict accordance with manufacturer's written instructions and recommendations.

2.3 GROUND RODS

A. Provide copper ground rods, minimum 3/4" diameter and 10'-0" long, which conform to UL 467, Grounding and Bonding Equipment where indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Leave ground connections accessible for inspection.

B. Install ground rods minimum 8 feet into earth. Space adjacent ground rods minimum 6 feet apart.

C. Provide a separate ground terminal for each ground conductor in each panelboard, switchboard, and similar electrical equipment enclosures.

D. Install all grounding in accordance with the latest edition of the National Electrical Code.

* END OF SECTION 16450 *

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

A. Provide all lighting fixtures, as shown on drawings and as described herein, complete with all necessary wiring, sockets, lamps, auxiliaries, supports, etc..

1.3 SUBMITTALS

A. Provide shop drawing submittals for each Fixture and Ballast type in accordance with Division 1 Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include Manufacturer's standard published literature for each fixture type. Clearly indicate all options, accessories, finishes, etc., to be provided with each fixture type.

C. Provide construction drawings for custom fixtures and/or accessories to include mounting details, manufacturing methods, wiring methods, finishes, materials, etc., as required.

D. Include Manufacturer's standard published literature for each ballast type to be used on the project. Provide literature for each ballast manufacturer which the fixture manufacturer may use depending upon availability at the time the fixtures are manufactured.

PART 2 - PRODUCTS

2.1 FIXTURES

A. Provide fixtures which comply with the appropriate Underwriters Laboratories (UL) Standards for the fixture type and which are UL Listed and UL Labeled.

B. Acceptable fixture manufacturers and types are indicated on the Fixture Schedule included with the Drawings.

1. Listing of the manufacturer's catalog numbers on the Fixture Schedule is intended to establish the general fixture type required and does not relieve the contractor and/or supplier from the responsibility to provide all accessories and options included in the fixture description nor from meeting the requirements of this specification.

2.2 HIGH INTENSITY DISCHARGE (HID) BALLASTS

A. Provide UL Listed, High Power Factor, High Intensity Discharge (HID) Ballasts which conform to the applicable ANSI Designation for the wattage and type of lamp served.

B. Ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type, UL listing and Date of Manufacture Code.

C. HID Ballasts shall contain no PCB's.

D. HID Ballast Warranty shall be 2 Years from the "Date of Manufacture" Code on the ballast.

2.3 LAMPS

A. Provide lamps of the Wattages, Types, and with color characteristics as indicated on the Fixture Schedule included with the Drawings.

B. Provide High Intensity Discharge (HID) lamps suitable for the installed burning position which conform to the applicable ANSI designations for the wattage and type of lamps specified on the drawings.

C. Acceptable Lamp Manufacturers, subject to compliance with the Contract Documents are General Electric, Phillips, Sylvania and Venture.

2.4 LIGHTING POLES

A. Provide all outside lights and poles.

B. Provide reinforced concrete bases for the lighting poles in accordance with the applicable Division 3 Specification Sections and as detailed on the drawings.

2.5 POLE FIXTURE FUSING

A. Provide breakaway fusing in the handhole of each pole mounted light fixture as follows:

1. Fuse holder for 120 or 277 Volt Circuits: Buss type HEB-JW, 600 Volt, with single conductor load side screw terminal and line side copper rod terminal for connection to breakaway receptacle.

2. Fuse holder for 208, 240 or 480 Volt Circuits: Buss type HEX-JW, 600 Volt, with single conductor load side screw terminal and copper rod line side terminal for connection to breakaway receptacle.

3. Breakaway Receptacle: Buss type RLC-J with single conductor line side screw terminal or type RYC with two conductor line side screw terminal as required.

4. Provide Buss type 'L' single conductor or type 'Y' two conductor waterproof insulating boots as required for load and line side conductor terminations.

5. Provide each fuse holder with Buss type KTK, 600 volt fuses. Size fuses at approximately 150% of the protected ballast(s) nameplate ampere rating or as recommended by the ballast manufacturer.

2.6 EXTRA STOCK

A. Provide the following extra stock of materials to the Owner.

1. Lamps: 10% , but not less than 2 of each type used on the project.

2. Pole Fixture Fuses: 10%, but not less than 1 of each type used on the project.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Where multiple fixtures occur, space them uniformly and in straight lines with each other.

B. Install fixtures and poles in accordance with the manufacturer’s written installation instructions.

3.2 SUPPORTS

A. Provide all necessary connectors, straps, etc., for secure mounting of all fixtures.

3.3 LAMP BURN-IN

A. Burn-in all HID lamps for a minimum of 100 hours prior to completion of the project and replace all defective lamps.

3.4 COORDINATION

A. Verify available voltages and coordinate fixture voltage with the fixture supplier prior to ordering fixtures. Immediately notify the Engineer in writing of any discrepancies between available voltages and the specified fixture voltages.

* END OF SECTION 16500 *

SECTION 16510 - LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

B. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:

1. Sections 01030 - “Alternates”

2. Section 16110: “Raceways”

3. Section 16140: “Electrical Boxes”

1.2 SCOPE OF WORK

A. Provide Low Voltage Switching Systems consisting of relay panels, intelligent switches and photocells connected together by a dataline, complete with all associated wiring.

B. The system includes a DIN rail mounted time clock, photosensor control module and other low voltage control devices. These devices are totally compatible with the manual operation of the softwired switches.

C. Refer to drawings and Section 01030 - Alternates for work and equipment to be included in Additive Alternates.

1.3 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Component Pre-testing: All components and assemblies are to be factory pre-tested prior to installation.

C. System Support: Factory applications engineers shall be available for telephone support.

1. Local support shall be available from factory representatives trained in the operation and troubleshooting of the lighting control systems.

D. NEC Compliance: Comply with NEC as applicable to electrical wiring work.

E. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.

F. UL Approvals: Remote panels are to be UL listed under UL 916 Energy Management Equipment.

G. FCC Emissions: All assemblies are to be in compliance with FCC emissions Standards specified in Part 15 Subpart J for Class A application.

1.4 SUBMITTALS

A. Provide shop drawing submittals for the lighting control system in accordance with Division 1

Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include dimensioned construction drawings for all lighting control system components and accessories. Clearly indicate voltage, ampacities, load types, conduit entrance areas, materials, options, accessories, finishes, etc., to be provided with each lighting control system component and accessory.

C. Submit a one-line diagram of the system configuration to show all required interconnecting wiring between system components complete with required wire and cable sizes and types.

D. Submit installation wiring diagrams for all components including, but not limited to, lighting control panels, relays, time clocks, low voltage switches, occupancy sensors and photocell controls.

1.5 OPERATION AND MAINTENANCE MANUALS

A. Provide complete operation and maintenance manuals listing the manufacturer's name(s) and local service organizations complete with addresses, telephone numbers and other pertinent information.

B. Provide technical data sheets for the control panel and each device including all features and operating sequences, both automatic and manual. Indicate specific model(s) provide where more than one model is included on the data sheets. Indicate all options and accessories provided for each item.

C. Provide complete documentation for system as installed to include, but not be limited to, the following:

1. System 1-line showing all panels, number and type of switches, sensors, photocells and other devices.

2. Drawings for each panel showing hardware configuration and numbering.

3. Control panel wiring schedules

4. Wiring diagrams for each component.

D. Provide clear and concise typewritten operating instructions that give, in detail, the information required to properly operate the equipment and system.

E. Provide written record of field tests of system.

1.6 WARRANTY

A. Provide a 1 Year Warranty for the lighting control system in accordance with the General Conditions and Division 1 Specifications.

B. Provide manufacturer’s literature for specific items which the manufacturer normally warrants in excess of 1 year.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The drawings and this specification are based on the use of the TLC ProSys Level II Lighting Control System manufactured by General Electric.

1. The networked lighting control system to be provided under Additive Alternate No. 2 is based

on the use of a TLC Level III System manufactured by General Electric.

B. Other acceptable manufacturers, subject to compliance with contract drawings, are Leviton, TriaTek Lighting, and WattStopper.

1. Other acceptable manufacturer's shall include with their proposal an itemized list of all deviations from this specification which shall be forwarded to Project Engineer not less than 24 Hours after bid opening.

2.2 RELAY PANELS

A. Modular Relay Panels shall be UL listed and consist of the following:

1. Tub: Empty NEMA 1 enclosure that can accept an interior sized to accept up to 12, 24, or 48 GE RR7P or RR9P relays.

2. Power Supply: Transformer assembly with two 40VA transformers with separate secondaries. Transformers include internal overcurrent protection with automatic reset and metal oxide varistor protection against power line spikes. 120 or 277 VAC, 50/60 Hz. +/- 10% as indicated on the drawings.

3. Cover: Surface or Flush, as indicated on the drawings, with captive screws in a hinged, lockable configuration. A wiring schedule directory card shall be affixed to the cover's back.

4. Interior: Bracket and intelligence board backplane with pre-mounted relays. Interiors shall be provided with up to 12, 24, or 48 installed and tested relays.

B. Provide panel with an integral DIN rail mounting bar for easy installation of other system components (such as ProSys clock). Terminals shall be included in the interior to accept a dataline for the connection of softwired dataline switches to the system, or to allow a dataline to be run between multiple panels for network communications between the panels.

C. Provide panel with individual ON/OFF switches for both panel and dataline power.

D. Eight channels shall be provided in each interior regardless of size, each with an associated pushbutton to toggle the channel ON/OFF, and a terminal block for a separate dry contact input. Any number of relays in the panel can be assigned to each channel, with overlapping allowed. Channels shall be set up via "Softwiring", i.e. no hand held programmer or keypad is required. Systems that require programmers or keypads, or that change relay states during set up are not acceptable.

E. Each channel pushbutton shall provide LED state indication - RED shall indicate that all of the relays within the channel group are ON; NO LED shall indicate that all of the relays within the group are OFF, and GREEN shall indicate the channel's relays are in a MIXED state.

F. System shall accept future functionality upgrades without removal of the panel.

G. Relays shall be momentary-pulsed mechanically latching contactors rated at 20 amps, 120 - 277 VAC. They shall attach to the Interior by a single plug-in connector.

1. Next to each relay shall be an individual override button and an LED to indicate status. LED shall indicate RELAY ON, RELAY OFF, RELAY FAILURE.

H. Provide captive screw terminations for all wiring connections.

I. Each channel button's dry control contact input terminal shall accept either 2 or 3-wire, maintained or momentary inputs. They shall also accept a 2-wire toggling input.

J. Each channel shall also have an associated 1 amp, 30 VDC isolated contact which may be used for status feedback or pilot light control.

K. The Relay Panel shall use an EEPROM to record the channel softwiring assignments and the current status of all relays, thus insuring a 40-year backup of information in the event of a power failure. Systems that require a chargeable battery with less than 10 year's life shall not be allowed.

L. The unit shall provide LED status indication of the power supply status. Access to 24VAC and 24V rectified power for accessory devices shall be provided within the panel.

2.3 NETWORK DATALINE

A. The intelligence in multiple panels shall be linked over a single dataline that uses the open Echelon/LonTalk™ protocol for communications, and be fully LonMark® and LNS (LonWorks® Network Services) compliant. The dataline shall provide a highly reliable communications bus for transferring control and status between the relay panels. The dataline shall be self-powering at each relay panel and not require any ancillary equipment to function properly.

B. The dataline, in addition to linking together multiple relay panels, shall be provide a single communications bus to allow softwired dataline switches to communicate with the panels.

C. The dataline can also connect to a single softwired dataline timeclock mounted in the interior of a relay panel or a separate enclosure at another location.

D. Dataline shall be 18/4 twisted conductor with shield meeting Class 2P NEC code requirements. The dataline can be run in a loop, serial, or star configuration. Minimum 1 turn per 3 inches; 50 pf/ft. max.

1. Maximum length for all dataline wire in the system shall not be less than 1,500 feet.

2. Maximum number of devices (panels/switch modules/timeclocks) on a dataline is shall not be less than 127.

2.4 SOFTWIRED DATALINE SWITCHES

A. To allow individual overrides, dataline switches shall be terminated to each panel's 4 wire "Local Dataline". Switches shall be available in either single, dual, quad, or octal (1 button, 2 button, 4 button, or 8 button) designs. The single, dual, and quad devices mount in a standard single gang box, while the octal version mounts in a two gang box.

B. Each button in a switch module can be individually programmed. Programming is done by a "Softwiring Sequence" rather than with a handheld keypad or laptop. Each button can be assigned to any one of the following four functions:

1. Control any individual relay in any single panel

2. Control any group of relays in any single panel

3. Control any of the eight channels (A-H) in a single panel

4. Control the same channel letter (A-H) in any chosen group of panels in the system.

C. For applications that require pattern switching, any button can perform its function using a "ON/OFF/Not Controlled" pattern of relays instead of the normal All ON/All OFF.

D. Switches shall have a non-breakable Lexan body and a matching screwless Lexan wallplate.

E. Each switch module shall use a bi-color LED pilot light for the individual buttons to indicate status of the controlled relay or group of relays. LED indications are Red for All ON, Green for Mixed State (some relays in the group ON and others OFF), and No LED for All OFF.

F. Switch shall also include a locator light.

G. Individual buttons shall have a removable clear cover to allow standard 3/8 inch tape to used for labeling the controlled loads.

H. The dual, quad, and octal switches shall all include a single master button that will override all relays controlled by the individual buttons OFF, or Restore them to their original state. Each switch unit's master button function can be configured to perform a "Master On/Off", "OFF Only", or "Disabled" function if desired.

I. Dip switches on the back of the module shall allow switch units to be designated for "Cleaning Crew" Control. This prevents the switch from turning off the occupant's lights accidentally.

J. Each switch module is available in a Smart Keylock version. Once a key is inserted, the individual buttons will function for five minutes.

2.5 SOFTWIRED CLOCK

A. Using the same dataline as mentioned above, provide a softwired timeclock. From any plug-in point on the dataline, timeclock can be used to: (1) schedule any of the 8 channel groups (A-H) in the relay panel network and (2) program softwired dataline switches. Schedules are defined using "Occupied vs. Unoccupied" times to simplify data entry.

B. Timeclock shall include user-selectable intelligent scenarios to handle standard lighting control functions for each channel independently. Selectable scenarios shall include:

1. Scheduled ON / Scheduled OFF

2. Manual ON / Scheduled OFF

3. Astronomical ON / Astronomical OFF (with optional offset)

4. Astronomical ON / Scheduled OFF (with optional offset)

C. Each channel can be assigned a standard time delay from 1-256 minutes. During "Occupied" hours, the time delays do not take effect. During "Unoccupied" hours, the time delays will ensure that overridden lights are automatically turned off.

D. Each channel can be assigned an automatic "blinking" of the lights before they are turned off to allow occupants the opportunity to enter an override without being put in the dark. The time interval between the blink warn and "off" operation shall be user configurable between 1 and 15 minutes.

E. The timeclock will provide a clear 9-line, 22-character per line display and a simple user interface. A single button can be used to bring up a context sensitive help screen to assist the user.

F. Timeclock to take into account leap year, daylight savings dates, holidays, and be certified as "Year 2000 Approved".

2.6 PHOTOCELLS

A. Each photocontrol point shall consist of an architecturally compatible sensor mounted in the appropriate location for measuring the available daylighting. Each sensor will have a separate

control/calibration module mounted in an enclosure adjacent to the lighting control panel. The sensor shall connect to the control/calibration unit via a single 20/4 shielded conductor with a maximum distance of 500 ft. The control unit shall be powered by 24 VAC.

B. Control/Calibration Unit:

1. Control unit shall allow for either direct control of up to three separate devices. These devices can be a relay, or any other device which allows control by a three wire momentary contact.

2. Control unit shall be a standard device which can work with any of the 4 possible sensor devices. The unit shall be switchable between four Footcandle measurement ranges (1-10 FC, 10-100 FC, 100-1000 FC, and 1000-10000 FC), depending on the sensor head and application.

3. Control unit shall have separate trip points for the High and Low response settings. These settings will be entered via easily readable dial switches, and will not require a separate meter or look-up table to insure a reliable footcandle setting. LEDs shall be provided to illustrate whether the sensor is below the "Low" setting, above the "High" setting, or in the deadband range.

4. Control Unit shall allow for a momentary contact device to override the photocell relays to either an ON or OFF state.

5. Control device shall employ a 3 minute time delay between switching outputs to avoid nuisance tripping. It shall be possible to disable the time delay to aid in initial setup and troubleshooting.

C. Each sensor shall employ photodiode technology to allow a linear response to daylight in it's given footcandle range.

1. For Exterior Lighting: A hooded sensor that can be horizontally mounted on a 1/2" KO or threaded conduit. Shall employ a flat lens, and work with a footcandle range between 1-10 or 10-100 in 10% increments. The entire sensor shall be encased in optically clear epoxy resin.

2.7 SOFTWARE

A. Manufacturer shall provide Windows®-based configuration “plug-ins” for system commissioning, programming, monitoring and control. Software shall be capable of functioning with any available LNS network tool.

B. Once the system parameters have been programmed, system shall allow any user-definable feature (schedules, relay groups, switch assignments) to be field modified without the need for configuration software or systems integration expertise.

2.8 ADDITIVE ALTERNATE NO. 2: SYSTEM NETWORK

A. Furnish and install a central dataline access port to provide central monitoring, programming, and control of all lighting relay panels.

B. Provide a Color Desktop Personal Computer with a SCVGA color monitor for enhanced color graphics display, color printer, and operating software. The system shall be shipped complete with all memory, cables, and peripheral devices. The complete system shall be factory tested prior to shipment.

C. Provide all lighting relay panel with intelligence and/or communication upgrades necessary for proper operation with system network.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the lighting control system in accordance with the Contract Documents and the Manufacturer's written instructions and recommendations.

B. Install all low voltage wiring in strict compliance with all the provisions of NEC Article 725 Parts A and C, for Class 2 Remote Control, Signaling and Power-Limited Circuits. Do not install Class 2 control wiring in raceways or enclosures with any other wiring systems.

C. Install all cables or raceways concealed within ceilings or walls. Exposed cables or raceways will not be permitted unless specifically shown on the drawings or approved in writing by the Engineer.

D. Support all cables in accordance with National Electrical Code requirements for the type of cable system installed. Support raceways, outlet boxes, etc., in accordance with the appropriate Division 16 Specification Section.

E. Clean all spatters, spots, dirt and debris from the inside and the outside of all lighting control system equipment and devices upon completion of the installation using methods and materials recommended by the manufacturer.

3.2 SUPPORTS

A. Provide a minimum of four supports, located at each corner of each relay panels. Where the enclosure exceeds 36 inches in any dimension, provide additional supports at 24 inches on center maximum.

3.3 SPARE CONDUITS

A. Stub empty conduits out from each flush mounted relay panel and extend into accessible area such that circuits can be installed without damaging finish of walls in the area surrounding the panelboard. Provide one 3/4" empty conduit for each set of three spare relays and/or spaces provided.

3.4 MOUNTING HEIGHT

A. In general, mount control panels 6 feet above finished floor or grade to top of panel.

B. Mount low voltage switch control station at height specified for light switches in Section 16140, Wiring Devices.

3.5 IDENTIFICATION

A. Provide engraved nameplate to identify each control panel in accordance with Section 16195 - Electrical Identification.

B. Provide a neatly typed index to identify the specific location and load controlled by each relay in each control panel as required for panelboard circuit indexes in Section 16195, Electrical Identification.

C. Provide engraved nameplates, custom engraved coverplates, printed silkscreen or Kroy labels, or typewritten labels behind protective plastic covering to identify the function of each switch in each control station. A single control station with a single switch controlling all lighting in a single room does not need to be labeled.

D. Color code control wiring as recommended by the manufacturer. Identify individual conductors in each outlet box, pull box or other accessible location according to panel and/or switch number

with self adhesive printed markers equal to Thomas & Betts "E-Z Code" markers.

E. Identify all power wiring according to panelboard circuit number. Include the panel designation where circuits originate from multiple panelboards.

3.6 MANUFACTURER SUPPORT

A. Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of all system components prior to energizing any part of the lighting control system.

1. Coordinate initial programming requirements with the Owner.

3.7 TESTS

A. Conduct a complete operational test of the lighting control system upon completion of installation. Test each relay and each switch to confirm proper operation of the connected loads as recorded on the directory card in each panel.

B. Keep a written record of all tests and include copies in the operation and maintenance manuals.

3.8 TRAINING

A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance and operating personnel who will be in charge of the system.

1. Provide instruction to the Owner’s operating and maintenance personnel in the basic theories of operation of lighting control systems with hands on training of the system operation and programming.

2. Provide instruction to the Owner's maintenance personnel in the procedures and schedules involved in troubleshooting, servicing, and preventive maintenance of the system.

3. Provide a minimum of 4 hours, but not more than 8 hours, of training to be completed prior to Substantial Completion.

4. Schedule training with the Owner at least seven days in advance at a time and place acceptable to the Owner.

* END OF SECTION 16510 *

SECTION 16910 - AUTOMATION SYSTEM CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

B. Section 16110 - Raceways

C. Section 16115 - Outlet Boxes

1.2 SCOPE

A. Furnish and install raceway system, junction boxes, wiring, control devices, etc., for control of new Quad Area Lighting from the existing Johnson Controls Inc. Campus Automation System as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.1 ACCEPTABLE AUTOMATION SYSTEM CONTRACTOR

A. Johnson Controls Inc., 2255 Technology Parkway, P.O. Box 27487, Salt Lake City, Utah, 84127-0487, Telephone: (801) 973-4001, hereinafter referred to as the Automation System Contractor.

2.2 SYSTEM TIE-IN

A. The Automation System Contractor will furnish and install all necessary hardware required for separate Digital Inputs from the existing Johnson Control Metasys Digital Control Panels to the new exterior lighting control panel.

2.3 SOFTWARE MODIFICATIONS

A. The Automation System Contractor will furnish and install all hardware, software modifications, and programming at the existing Johnson Control Panels in the Construction Trades building and at the existing Johnson Control Metasys Operator Workstation located in the Central Heat Plant, for the following functions:

1. Enable operation of Quad Area Lighting by a relay contact closure. Additional closure a photocell provided by the electrical contractor will be required to turn on the Quad Area Lighting.

2. Turn off Quad Area Lighting by opening the relay contact at a time designated by the Owner.

2.4 RELATED WORK BY ELECTRICAL CONTRACTOR

A. The Electrical Contractor will furnish and install the Quad Area Lighting Control Panel as shown on Sheet ES601 of the drawings.

B. The Electrical Contractor will furnish and install all control wiring from the Lighting Control Panel to the existing Johnson Control Digital Control Panels as shown on the drawings. Termination of the conductors will be by the Automation System Contractor.

PART 3 - EXECUTION

3.1 COORDINATION

A. The Electrical Contractor and Automation System Contractor shall coordinate with each other to ensure that all Automation System Control work is properly installed and properly interfaces with the electrical system work.

* END OF SECTION 16910 *